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*Technical education in
a Saxon town*

Henry M. Felkin

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TECHNICAL EDUCATION IN A SAXON TOWN.

BY

H. M. FELKIN.



ROYAL TECHNICAL INSTITUTION, CHEMNITZ.

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H.M.F.

CHEMNITZ, KASTEN STRASSE,

April, 1881..

P R E F A C E .

IN publishing the following account of the Technical and other Schools at Chemnitz, in Saxony, the Council of the City and Guilds of London Institute have desired to give some idea of the magnitude of the efforts that are now being made in a comparatively small German town, to bring the education of artisans into close relationship with the practical requirements of their daily work. The author, having resided for some years in Chemnitz, has had exceptional opportunities of becoming acquainted with the details of the courses of study, and of the expense of maintenance of the several schools referred to in his book ; and, as a native of Nottingham, he has been able to compare German with English workmen, and to accurately estimate the value of systematic technical teaching in cheapening and improving manufactured products.

The Council believe that the full and detailed description of the schools of a single manufacturing

town, which is given in this little work, will be in many ways more useful to those who are interested in the development of similar schools in England, than a more superficial and less complete account of German education generally; and the more so, since much that the author has written with respect to Chemnitz is known to be true of other towns in Germany.

There can be no doubt that England is awakening, none too soon, to the importance of educating, with special reference to their future careers, those who are to be engaged in industrial operations. In every walk of life it may be assumed that the success of the individual depends quite as much on the character and extent of his special technical training as on his earlier and more general education. In certain professions, this truth has been long since recognised; in others, it has only now begun to be understood; but it is admitted on all sides that the future development of the trade and commerce of this country will greatly depend on the success of the efforts that are now being made to provide efficient technical schools and colleges, in which primary and secondary education may be adequately supplemented.

Both here and abroad, it is generally felt that the old apprenticeship system is no longer sufficient

to make operatives fully conversant with the "mysteries" of their craft. The introduction of machinery into nearly every branch of industry has greatly changed the character of the relationship that formerly existed between the master and his apprentice ; and the application of science to industrial operations has, in not a few cases, transferred from the foreman or works'-manager to the practical science teacher the key to these mysteries, and has rendered necessary, for workmen of every grade, a different kind of training from that which was considered sufficient not many years ago.

The perusal of Mr. Felkin's small work, whilst showing what kind of provision is being now made in Germany to meet these new wants, may help those who are endeavouring to promote technical education in England to avoid errors resulting from inexperience, to appreciate the educational requirements of manufacturers and artisans, and to understand the best means of providing for these requirements.

What will strike every one who carefully examines the figures contained in the following pages, is the great cost of a well-organised system of technical instruction, adapted to the different kinds of manufactures and to the several grades of workmen. The townsfolk of Chemnitz are to be congratulated

on having thought so little of the expense, in comparison with the results to be realised. It remains to be seen whether, for the sake of increasing the industrial prosperity of this country, the people of England will be willing to make corresponding sacrifices.

GRESHAM COLLEGE, LONDON,
May, 1881.

TECHNICAL EDUCATION IN A SAXON TOWN.

PART I.

GENERAL EDUCATION.

HAVING resided at Chemnitz, in Saxony, since 1861, I have had exceptional opportunities of becoming acquainted with its numerous educational institutions. During a recent visit to Nottingham, my native town, I was requested by friends interested in technical education to give an account of the various schools and institutions devoted to this object in the town in which I have so long resided. As, however, to describe these schools alone, without reference to the other more general educational establishments of Chemnitz, is calculated to give but a one-sided view, and to cause them to be looked at as isolated institutions, I have thought it would be of more practical value and would lead to juster views to give an account, as detailed as may be consistent with the limits of this paper, of *all* the schools, general and technical, of the town, thus showing the educational equipments which are deemed necessary, and have been already completed, in a German town of 89,000 inhabitants.

To do this properly would require more of time and knowledge than is at present at my disposal. Especially, to give a correct idea of the *quality* of the education imparted, would necessitate the consideration of a mass of detail which would be appreciated only by specialists, and would be wearying to the general reader. I shall therefore try to give in outline a sketch of each school, with its object and place in the general

system. For, although they have grown with the town and have been added one after another as the want was felt, the schools are so graded and interwoven with one another, that whilst all are necessary, none are superfluous, and they consequently form together a united whole, suited to the requirements of the population of the town.

In forming a judgment of any system of schools, they must be looked at in relation to the wants of the people for whom they are intended. In the many references to foreign schools one sees in English newspapers and pamphlets, this point is often overlooked, and schools specially suited to one place or class of people, or to particular requirements, are held up to general admiration altogether apart from the wants they are intended to satisfy. Luther preached once an admirable sermon on marriage duties to a hospital of old toothless men and women ; it was intrinsically good, but out of place. I will avoid this fault, and as Chemnitz is a large manufacturing town, like Nottingham, resembling it too in the fact that hosiery is one of its staple manufactures, and, moreover, as the town of Chemnitz has already taken away the glove trade from Nottingham, and is, in the opinion of many, slowly undermining the trade in cotton hosiery too, it cannot but be important to the people of Nottingham to know something of the educational advantages which have enabled the Saxons to do this. For, in the writer's opinion, neither in *physique* nor in energy and natural ability are these Saxons equal to Englishmen. On the contrary, the human raw material in Saxony is inferior to that of the midland counties, and yet the weaker race takes the bread out of the mouth of the stronger, and competes with it in the markets of the world. What enables it to do this ? The answer to this question will partly be found in the educational advantages which the people of Chemnitz and of other German towns undoubtedly possess.

Before proceeding to the main part of my subject, a short account of Chemnitz may be interesting. When I first knew it, now nearly twenty years ago, it contained a little over

40,000 inhabitants, and has, in spite of bad years, continued steadily to increase, as the following figures prove :—

On December 1st, 1864, population was 54,827.			
"	"	1867,	58,573.
"	"	1871,	68,229.
"	"	1875,	78,209.
"	"	1879,	89,224.

It is the third largest town in Saxony. Dresden, the capital, is the largest, and Leipzig is the second, being the great commercial city, not only of Saxony, but of central Germany, while Chemnitz is the principal manufacturing town. It is the centre of a large number of smaller towns and villages lying in the valleys which run up between the mountains in the immediate neighbourhood, and the produce and manufactures of these places mostly pass through the town. They each have their own special industry connected with, and dependent on, the main industries in Chemnitz, so that although the town has a population of 89,000, it represents the industry of probably double that number carried on and spread over a large area of ground, partly in factories and partly in the homes of the workpeople, for house industry is still largely pursued in the country districts. The town is situated in a long valley in the lower range of the Erz mountains, about 50 miles from Dresden and 40 from Leipzig, and lies about 550 mètres above the level of the sea. One or two small streams flow through it which come down from the mountains, and it is from these, as dyeworks were gradually established, that the prosperity of the place took its rise.

The country to the north gradually slopes down to the great open plain which extends more or less from Leipzig to the North Sea. The mountains rise on the south, and are full of picturesque but not very fruitful valleys, reminding one of Yorkshire and Lancashire—the running water supplying power to the numerous spinning-mills, weaving factories, &c., in the little towns and villages, which serve commercially as feeders to Chemnitz. The climate is mountainous in its character, hot in summer, cold in winter, and this northern

slope of the Erz mountains being exposed to the north, north-west, and west, makes it extremely variable and trying. The climate being thus unfavourable to agriculture, and the land being for the most part poor, the inhabitants of this northern range of the Erz mountains are dependent upon industries, manufactures, and mining for their subsistence; and out of their very poverty and destitution have built up industries which now hold their own in the markets of the world. One thing especially has favoured this growth in past times—the magnificent forests of pines which once covered these hills and mountains, and are still very extensive. Wood in former times was the only fuel, and is so to some extent even now, and being plentiful and cheap, was used for building weaving-loom, stocking-frames, for making toys and many other articles. Of late years extensive coalfields have been opened up in the neighbourhood of Zwickau and Oelsnitz, towns only a few miles distant from Chemnitz, which supply Saxony and Bavaria, besides other countries.

Chemnitz is thus, as far as situation goes, well calculated to become a large manufacturing centre, and is without doubt the future Manchester of Germany, as it is now of Saxony. It is a large railway centre, the lines converging there nearly all belonging to the State; and a few years ago, when the State railway works were moved to Chemnitz, some 5,000 inhabitants were added to the population of the town. Professor Stuart, in his late valuable address, referring to Chemnitz, did not seem to consider its position in Germany as comparable to that of Nottingham in England. In this I think he is mistaken; it is relatively a far more important town; and from its central position in Europe, the vicinity of extensive coalfields, and the necessity of a large surrounding population finding subsistence in it, and also from the cheapness of labour, it is calculated to become in the future a great centre of industry. The Government has wisely fostered the growth of the town and its trade in every possible way, by establishing technical schools and granting assistance to other schools, and by having established there

a military centre. It is also currently reported that the Government has in past times advanced capital to develop more than one large manufacturing concern.

The industries of the town may be classed under four main heads :—

Machine-building of all kinds.
Cotton and wool-spinning.
Weaving.
Hosiery and glove manufactures.

To this variety of trades, and to the fact that it is not dependent on merely one staple industry, the prosperity of the town is mainly due. There are, besides these, other auxiliary trades, such as dyeing, bleaching, trimming, finishing, &c., giving employment to a large number of people.

In the machine-building trades a large number of work-people are employed in making all kinds of machines—locomotives, steam-engines, cotton, wool, linen, and jute spinning-frames, also weaving-loom, brewing machines, and in the making of tools—in fact, of almost every kind of article made from iron, excepting agricultural implements, ordnance, and arms of precision. At the present time there are—

46 concerns for building general machinery.
10 " " " weaving looms.
3 " " " hosiery frames.
10 dealers in machinery.
7 " " knitting frames.

The largest of these, that founded by the late Mr. Richard Hartmann, is the only locomotive building establishment in Saxony. It was turned into a company in 1869, and has employed—

				Average Weekly Wages.	
From 1st April, 1869, to 30th June, 1870,	2,410 workmen,	earning	£0 13 0½		
„ 1st July, 1870,	„ 1871, 2,211	„	„	0 13 2	
„ „ 1871,	„ 1872, 2,739	„	„	0 15 6	
„ „ 1872,	„ 1873, 2,817	„	„	0 16 10½	
„ „ 1873,	„ 1874, 2,829	„	„	0 18 1½	
„ „ 1874,	„ 1875, 2,693	„	„	0 17 10½	

						Average Weekly Wages.
From 1st July, 1875, to 30th June, 1876, 2,228 workmen, earning £0 16 2						2
"	"	1876,	"	1877, 1,806	"	0 15 11
"	"	1877,	"	1878, 1,842	"	0 16 3
"	"	1878,	"	1879, 1,730	"	0 16 4½

The principal markets for this industry are, besides the home German trade, Russia, Austria, Holland, &c.

The cotton and wool spinning branch is represented by

7 mills in Chemnitz.

11 ,, the immediate neighbourhood.

But by far the greater number of mills are in the villages round about the town, and in the Zschopauer and other valleys within a radius of fifteen or twenty miles. These mills, like those in Lancashire and Yorkshire, were built originally to be worked by water-power only, but are now supplemented by steam. There are thirty-seven yarn merchants and dealers in the town, who sell the produce of these mills, and who in many cases find the wool, engage to take the whole production of the mill, and pay the owner so much for spinning the yarn. Many small mills with limited capital are worked on this system.

The weaving industry is the oldest one in the town and district. There are now *eighty-two* concerns, including seventeen for fancy goods. In the earlier years of the industry, from 1820 to 1830, principally cotton goods were woven, and entirely on hand-loom, in the homes of the weavers. In 1863 there were, according to the Report of the Chemnitz Chamber of Commerce, 1,973 hand and jacquard looms, employing as many weavers, and making damasks, tablecloths, bed-coverlets, dress goods of silk and thread, woollen and half-woollen stuffs, &c.; and in 1865 there existed seventeen firms, owning 786 power-loom, or 240 more than in 1864.

The home industry is rapidly declining, and is being supplanted by power looms in factories. At the present time goods are sent to most European countries excepting England, to South America, Mexico, Turkey, the Levant, Havanna, &c.

During the last few years jute has been extensively used for furniture stuffs, tablecloths, &c., and a large increasing trade been done in these articles.

In the hosiery trade there are altogether sixty-four firms in Chemnitz itself, twenty-six of these are glove-makers, and the remaining thirty-eight hosiery manufacturers, besides a large number of other firms in Stollberg, Limbach, Burgstadt, and other towns in the immediate vicinity. The development of this industry has been most remarkable, and has taken place almost entirely during the last thirty years, and to such an extent that Chemnitz has proved itself a formidable and successful competitor to Nottingham, not only in the United States of America and all other export markets, but in the English market itself. The quantities of Saxon goods, both hosiery and gloves, poured into the London market, would surprise some Nottingham manufacturers, and astonish still more the stocking-makers and their leaders. The comparative cheapness of labour, owing partly to the absence of artificial means of keeping up wages, and the intelligence of manufacturers in adapting themselves to the demands of the trade account for this. The manufacturers are now bestirring themselves to obtain a footing in the English colonial market, a trade from which they have hitherto been shut out, except in so far as they have reached it through the large London houses. A Chemnitz gentleman, Mr. Bahse, formerly resident some time in Nottingham, has been sent out to the Sydney Exhibition by the Chemnitz Chamber of Commerce, to superintend the Saxon exhibits, to collect information, to open accounts, and so to lead to a direct business, and he is to stay for the Melbourne one later on. He took samples with him of various classes of goods, and has since sent home reports on them for the benefit of manufacturers.

The glove trade may be said to have been transferred from Nottingham to Chemnitz, and is now in a more flourishing condition than it was ever known to be before, so that factors are simply told to deliver all they can produce, and wages

for special classes of goods have risen so that good hands can even earn up to 40s. per week. The loss of the glove trade to Nottingham is a striking example of the way in which England is being robbed in detail of her industrial supremacy. The hosiery trade has been in a transition state for twenty years past, and is being turned from a home industry into a factory one, owing to the introduction of power machinery, and the substitution of iron for wooden frames. When the writer first came to Chemnitz, in 1860, there were literally no iron frames in the district, excepting circular ones; the goods were all manufactured in the surrounding villages; middlemen, or factors, as they are called, collected the goods, and delivered them to the merchant in Chemnitz, who distributed them to the various export markets. One or two factories existed containing circular machinery, and a few power rib frames.

According to the Chamber of Commerce Report of 1863, there were in Chemnitz and in about thirty of the surrounding villages, the following number of frames, viz.:—

About 27,000 wooden hand looms.			
420	"	"	rib looms.
99	iron	"	looms.
495	"Ketten"	"	looms for gloves.
303	French	circulars.	
4,258	heads	"	
49	wide plain and rib	rotaries.	

But more than 18,000 of the wooden hand ones were standing in 1862, owing to the American crisis, then just at its height.

About that time the power loom patented by Messrs. Paget, of Loughborough, was introduced, and has, with improvements since put to it, gradually spread itself all over the country. The wooden frames are dying out, and large factories have been built and fitted with power machinery of different systems and of the most modern construction. Almost every large merchant has now such a factory full of machinery obtained from Nottingham, or from some builder in Chemnitz. This change has placed the industry on a par with that of Nottingham, and the establishment at the same time of the technical school at Limbach, has enabled a

class of young men to be educated for the trade, who have been made acquainted with modern machinery and systems of manufacturing, and have been carefully trained for various situations as foremen, managers, clerks, and takers-in. Meanwhile, too, the sons of manufacturers have been preparing themselves to take their fathers' places. These younger men now coming into the trade are, thanks to this technical education, of a different stamp from those of twenty years ago, and are already exercising a marked influence on the development of the trade. The same may be said of the Weaving School, to be described later on, and of its effect on the weaving trade, which has gone through the same change as described in the hosiery trade.

Having thus obtained a general idea of the industries of the town and district, we can form some conception of the requirements necessary for general and technical education, to enable these industries not only to hold their own, but to continue to progress in the future as they have done in the past. To remain stationary is to recede, and in a world of progress the *statu quo* soon becomes the *statu quo ante*.

We will now see what has really been done to provide suitable technical instruction for those engaged in these several Industries at Chemnitz. The schools of Chemnitz, both general and technical, are all public ones. Private adventure schools do not exist. Those relating to general education, both elementary and secondary, are municipal institutions and under municipal management, and are, with similar schools all over Saxony, placed under the Minister for "Cultus" and Education. The technical schools are either State institutions or belong to some public body, and are under the oversight of the Home Minister.

The following is a general outline of all the schools:—

SCHOOLS DEVOTED TO GENERAL EDUCATION.

(Under the Education Minister.)

1. The Royal Gymnasium, or Classical School.
2. The Municipal Real School of 1st Order.
3. The Public Mercantile School.

SCHOOLS DEVOTED TO GENERAL EDUCATION—*continued.*

4. The Municipal Higher Boys' School (A).
5. „ „ „ Girls' „ (B).
6. „ „ „ „ (C).
7. „ 1st District Municipal School (boys), Theater Strasse.
8. „ 2nd „ „ „ (boys and girls), Waisen Strasse.
9. „ 3rd „ „ „ „ Bernsbach Platz.
10. „ 4th „ „ „ „ Körner „
11. „ Roman Catholic School.
12. „ Orphanage House „
13. „ Nicolai School.

TECHNICAL AND TRADE SCHOOLS.

(Under the Home Minister.)

- 1st. The Royal State Technical Educational Institutions, comprising—
 - (A.) The Higher Technical School.
 - (B.) „ „ Royal Builders' „
 - (C.) „ „ Foremen's „
 - (D.) „ „ Technical Drawing School.
- 2nd. The Higher Weaving School.
- 3rd. „ Hosiery School (at Limbach)
- 4th. „ Agricultural School.
- 5th. „ School for Hand Weavers.
- 6th. „ „ Tailors.
- 7th. „ „ „ (Trade) School (Males).
- 8th. „ „ „ (Trade) School (Females).

I will now proceed to describe each of these schools separately, and will endeavour to omit all details likely to be uninteresting to the reader.

THE ROYAL GYMNASIUM, or Classical School, is the highest institution in the town devoted to general education; it was founded on 13th October, 1868; and is a State institution. At the end of February, 1879, it was attended by 357 pupils, who reside, if natives of Chemnitz, with their parents, otherwise in suitable lodgings under the supervision of the rector or masters. The *personnel* of the school consists of

The Rector.	
The Sub-Rector	1 Assistant Master
17 Head Masters	1 Teacher Gymnastics
1 Drawing Master	2 Clerks, &c.

Instruction is given in 13 classes. The building in which this school is housed was opened in October, 1872, and is one of the finest public buildings in the town, situated on the Kassberg, a hill overlooking the town, on a commanding site, about seven or eight minutes' walk from the

market-place. It was, when first built, 63 mètres long and 20 deep, three storeys high, and stood on a raised basement. Some two years ago it was enlarged by adding three windows to each wing, and it is already too small for the requirements of the district, and will again be enlarged in two years' time. Provision has wisely been made for future wants, the land on which it stands comprising some 5,700 square mètres. The building was erected at a cost of about £9,450, to which, if we add the cost of the Gymnastic Hall, viz., £1,050, and the value of the land, £2,853, we have a total of £13,353, which represents, with the addition just mentioned, a capital of at least £15,000 to £16,000 sterling. Its object is to furnish a first-class classical education for those who intend to devote themselves to the learned professions, or to become teachers ; but it is also attended by many who intend to devote themselves to mercantile pursuits.

The curriculum comprises—Religion, Hebrew, Greek, Latin, German, French, English, Algebra, Geometry, Physics, History, Singing, Drawing, Gymnastics, and Mathematical Geography. It is attended principally by boys from Chemnitz and the towns in the immediate neighbourhood. Boys are received into the school when ten years old, if they have received a fair previous education. There is a fine large hall for gymnastics, and a healthy *esprit de corps* prevails and is encouraged amongst the boys. The fees are in all classes alike—£6 yearly. If any boy is unable to pass through one class in two years, he is obliged to leave the school. This school is preparatory to the seminaries and the university, and affording as it does a liberal classical education, it is specially useful in a purely manufacturing town like Chemnitz, where money-making is apt to be looked upon as the sole end of life. Its cultivating influence is already bearing fruit. The "Aula," or large hall—one of the handsomest in the town—is often used for public lectures of a high class.

This school is empowered by Government to grant so-called "one-year volunteer certificates," the meaning of

which may require a little explanation. The German compulsory military service is for three years. But such young men as are competent to pass a certain examination, proving that they have received a good education, are allowed to volunteer to do the service in one year, and are called "one-year volunteers." This is a great concession and alleviation to well-educated young men, enabling them to get through in one year what otherwise would require three. The certificates of certain of the higher grade schools, such as of this School and of the "Real" Schools of 1st Order, are accepted by the military authorities as sufficient to absolve students from the necessity of passing the examination. It follows therefore that the power to grant these certificates marks the rank of a school.

THE REAL SCHOOL.—We now come to the Municipal "Real" School of First Order, and many readers will wonder what new-fangled German school is this, and some may perhaps think it is to supply only an imaginary want. The word Real has no exact equivalent in the English language, and we shall have to adopt it as the Germans have done before us. It implies a school, if of the first order, of the same grade and standing as the gymnasium. The education is, however, based on natural sciences and modern languages, as against classics in the latter. It is the natural outcome of the wants of the middle classes of the present day. What is the use of wasting the time and energies of a boy in learning Latin and Greek, &c., who has to enter a business life at 15 or 16 while some knowledge of modern languages would be invaluable? This question has of late been much discussed in England. In Germany it was practically settled years ago, and the result is the Real School. The Real School was first instituted in Prussia, and was not introduced into Saxony till after the war of 1866, and the entrance of the latter country into the North German Confederation, when the Prussian military system was adopted in Saxony.

The Real School in Chemnitz is a large massive building in the centre of the town; it was built in 1869, and is municipal property. It cost as follows:—

Land estimated at..	..	..	..	£1,500 0 0
Building cost ..	..	..	..	13,265 0 0
Fittings, &c. ..	..	..	..	3,000 0 0
				<u>£17,765 0 0</u>



THE REAL SCHOOL, CHEMNITZ.

The fees are £6 per annum, and a small fee on entering and leaving. They are not sufficient to pay the expenses of the School, which receives £900 grant from the State yearly. In 1788 the deficiency required to be made up by the town was £1,269. 8s. 0d. The total expenses in 1878 were £4,834, of which sum £4,221 was for the salaries of the teachers. The school is under the management of a committee composed of one *stadtrath*, or alderman, two town-councillors, and the director of the school.

In 1879 the staff consisted of a Director, 18 Head and 2 Assistant Masters, 1 Drawing Master, 1 French Master, 2 Gymnastic Masters, 1 Writing Master, and 1 Stenograph Master.

The school was attended by 437 pupils, mostly from

Chemnitz and its suburbs, belonging to the middle classes. There are eight classes, arranged as follows:—

Upper Prima	1A	Tertia	3
Under „	1B	Quarta	4
Upper Secunda	2A	Quinta	5
Under „	2B	Sexta	6

The curriculum comprises the following subjects:—Religion, German language, French, English, history, geography, natural history, chemistry, physics, arithmetic, geometry, projection, freehand drawing, singing and gymnastics, besides certain specialities which are not obligatory. Boys who have attended one of the higher or district municipal schools are received at 10 or 11 years of age, and remain either through the whole course and then enter some trade or profession, or proceed to some technical school. It serves as a preparatory school for the technical State institutions, or for the Polytechnic in Dresden, or for the Mining Academy in Freiberg, the Weaving School in Chemnitz, or for any of the higher technical schools either in or out of Saxony. The education given is of a thoroughly sound and practical character.

THE PUBLIC MERCANTILE SCHOOL.—This School was founded in 1848, and from small beginnings and modest pretensions has grown to be a most important institution. Up to a short time ago it was compelled to put up with an old house rented for the purpose. The attendance increased so rapidly, and the usefulness of the school was so manifest, that an appeal was made to the merchants, &c., of the town to find funds for a suitable building. This was done by means of shares, liberally subscribed for by all the principal firms in the town. This School is consequently neither a State nor a municipal institution, but is the property of the shareholders. The new building was opened in October, 1879, and cost as follows:—

Land	£950	0	0
Building	3,250	0	0
Fittings.. ..	1,300	0	0
	<hr/>		
	£5,500	0	0
	<hr/>		

It is under the management of a committee of six merchants and the director.

It is divided into an upper and lower division. The upper one is for the sons of merchants and tradespeople who intend devoting themselves to a commercial career and have passed their 14th year. These have to undergo a preliminary examination, but boys who have passed the higher municipal school are able to enter at once. Those who attend this division have to devote their whole time to study. The school has a three years' course, and is now authorized to grant "one year volunteer certificates."

The lower or apprentices' division is for the benefit of apprentices in the various businesses in the town, and they attend afternoon and evening classes suitably adapted to their wants and to the time at their disposal.

Each division has three classes. At Easter, 1879, there were in the upper division 56 pupils, and in the lower division 85 pupils; and during 1878-79 there were 167 pupils in the school, as against 191 in the previous year. The staff consists of the director, a French and English master, a mathematical master, a drawing teacher, and three others for various subjects, making altogether eight. Instruction is given in the upper division, in mercantile science, in mercantile law, political economy, bookkeeping, correspondence, mercantile arithmetic, chemical and mechanical technology, mercantile geography, history, arithmetic, geometry, German, French, English and freehand drawing. The hours devoted to study are 36 weekly in Classes 1 and 2, and 35 weekly in the 3rd Class.

In the lower division, for apprentices, is taught mercantile science, bookkeeping and correspondence, mercantile arithmetic, French, English, mercantile history and calligraphy. Thirteen hours weekly are given to these studies.

The object of this school is thus to provide a suitable education for those who intend to devote themselves to a purely commercial career, as merchants, bankers, bookkeepers, accountants, bankers' clerks, correspondents, &c. A boy having

been educated at one of the municipal schools up to his 14th year and having then passed with credit a three years' course at this school, would be qualified to take a fair position in a counting-house or office which offered itself, and could command a small salary at once. There is a similar school at Leipsic and one at Dresden, both having a more extended curriculum, and enjoying deserved reputations.

THE PUBLIC MUNICIPAL SCHOOLS.—These comprise three higher and six district schools ; they are splendid institutions and justly celebrated throughout Germany. They are based on the education law of 1835 and on the new law of 1873. They are elementary schools in the strict sense of the word, yet I hardly like to use this term in describing them, as it is apt to suggest to an English reader's mind British-national, Board, and such like schools, which are very different both in scale and magnitude from these. To describe them fully would require an article to itself. They are what the Board schools of England will be in 15 or 20 years' time. They provide for the education of all the children in the town between the ages of 6 and 14. Private adventure schools do not exist, and consequently attendance at the elementary schools is compulsory. To enter the gymnasium and Real schools, boys are permitted to leave at the age of 10.

These schools form the basis of all education, secondary and higher, and the majority of pupils receive no other instruction whatever. Up to a year or two ago these schools were divided into upper, middle and lower citizens' schools, with a different scale of fees for each grade. As the town increased, however, and the distances become greater, more schools were required, and it was decided to build two new higher schools and to purchase the old Polytechnic from the State for a third one, and the whole system was reorganised. The middle schools were abolished, district schools, with an upper and lower division, were established in various parts of the town for the middle and lower classes, making use, of course, of existing buildings, and the higher schools were

retained for the upper middle class. The courses of instruction were enlarged and revised, and everything was put on the best footing.

They are under municipal management. The School Board is composed of—

The Bürgermeister.
 Three Stadträthe or paid Aldermen.
 Four Town Councillors.
 One Pastor.
 Three Directors chosen out of the nine Directors of the Schools.

These, with all similar schools, are under the Minister for Cultus and Education.

The school finances are entirely separate from the general finances of the town; a separate school budget is presented and published annually, and the expenses are met by the fees of the children and by a general school rate levied in the form of an income-tax on the inhabitants of the town.

The following statistics give a general view of these schools—compiled from official sources—and are the latest obtainable:—

To avoid misconception it may here be remarked that for all State, municipal, and school purposes in Saxony incomes are taxed; the levy is made on incomes as low as 5*s.* a week. Even domestic servants have to pay income-tax.

The scale of school fees is :—

		4 Lowest classes.	3 Middle.	3 Highest	
Higher boys' school....	48/.		54/.	60/	per annum.
	I. Division.			II. Division.	
District Schools	I. and II. class,	26/5 ..	} 7/3 per annum.		
" "	III. " IV. "	21/7 ..			
" "	V. " VI. "	19/3 ..			

The present system of elementary education, of which these schools are the outcome, is founded on the law of 1835. This law was amended and supplemented by that of 1873, to meet the altered and increased necessities of the times, and the "Fortbildung" schools, which will be explained hereafter were founded under the latter. The system is uniform throughout Saxony, the courses of instruction being the same, in so far the law prescribes a minimum which the smallest village school must attain to. This, however, does not interfere with the expansiveness of the system, nor hinder larger villages and towns from going *far beyond* this minimum, and providing, as the towns really do, a first-class education for the rising generation.

The first paragraph of the law of the 26th April, 1873, says :—

"The object of the elementary school is to provide for the youth of the country, by instruction, exercise and education, the principles of moral-religious culture, and the general knowledge required in daily life, as well as readiness in applying that knowledge." In Chemnitz the district schools have six classes, and the children must attend from the completion of their 6th to the end of their 14th year, and then must attend for two years longer the "Fortbildung" school. The higher boys' school has eight classes. One of the higher girls' schools has also eight classes, and the other ten classes; the latter having two additional "selecta" for girls from 14 to 16 years of age.

The new District Schools built within the last two or three years are model establishments in style, organization, arrangement and ventilation. They are not so large as those

earlier built, it having been found by experience that 800 to 900 children is the maximum number suitable for one school under one director. The largest building, that on the Waisenstrasse, containing nearly 4,000 pupils, was built about 20 years ago, and is so arranged that when all the children are engaged in writing the light comes in at the left-hand side. All these schools, and this fact the reader will specially note, are built on the class-room system, the plans and organization of the schools permitting no other. Each class of about 40 to 50 has its own teacher and room. There is no learning lessons in school—that is done at home, and the instruction given *tirâ voce* and with the help of the black-board goes on during the whole time the children are in school, so that they are *in direct mental communication with the teacher* during school hours. The order, quietude, discipline and attention thus secured are most remarkable. The rigid carrying-out of the class-room system, together with the mode of imparting instruction and the constant regular (compulsory) attendance, are the secrets of the success of these schools. Everything is taught (with one important exception) in such a manner, that it is mentally grasped by the pupil, and there is a minimum of learning by rote. A friend of mine, a scientific gentleman residing at Leeds, who made a journey of school investigation in France, Germany and Switzerland, on visiting these schools was much struck with this fact, and remarked that, excepting religion, literally nothing was taught by rote; but it appeared to him that religion was so taught, and I can confirm this, as far as my own experience is concerned. The school system is denominational, and theoretically realises approximatively Dr. Arnold's idea, that the area of the Church should be co-equal with that of the State. The theory is, or was a few years ago in Saxony, which is a Lutheran State, that every child born in geographical Saxony is born into the Lutheran Church and State. Within a week or two of birth the child is (compulsorily) baptised; at 6 years of age it enters the school and is taught religion and Lutheranism; at 14 it is supposed to be ready for confirma-

tion, the pastor taking the children in hand at about 13 years of age to prepare them for it. They are then confirmed and become members of the Church, and are thus duly manufactured, one might express it, into machine-made Lutheran Christians. The attempt has thus been tried under favourable circumstances to teach religion by a State system, and although the system has shown good results and fair success in secular respects, it is very doubtful whether it has succeeded in this. The State cannot command a supply of religious-minded and trusted teachers as it can of anything else, and the teachers, very properly, are chosen for the general qualifications, and not for religious ones. It has consequently broken down on this one point, as any State system of religious education must do.

These schools are under State inspection. The country is divided into school districts, and each district has its resident State Inspector, who makes an annual report to the Education Minister. The Chemnitz district comprises the town itself and a number of towns and villages adjacent, and contains 25,033 children, in December, 1878, with a population of 152,000 inhabitants.

The amount invested in the school buildings, about £116,000, does not represent their total cost or value. It is the estimated official value taken extremely low, and the land is not included. In England these buildings would represent a considerably larger amount, and even in Chemnitz, if they had to be built now and land acquired, it probably could not be done under £160,000 to £180,000 sterling. I subjoin to this notice of these schools the following summary of the aims, "ziele," which the district schools are to attain, obtained from an official source. It will give the thoughtful reader a very good idea of the education afforded in these schools, and if, as he reads, he will bear in mind the standard required by the English Revised Code, he will vividly realise how much we are still behind our German neighbours in elementary education:—

AIMS (ZIELE) OR THE STANDARD OF DISTRICT SCHOOLS.

RELIGIOUS INSTRUCTION:—Religion and Revelation;
Grounds of Faith and Morals; The idea of God

amongst the Heathen, Jewish, Mahomedan, and Christian nations.

Laws of Fraud and Perjury explained ; Laws of Evangelical Parochial Life explained ; The State ; Rulers and Subjects ; Masters and Workmen ; Meaning of Marriage and Civil Marriage ; Moral Purity ; Value of Honour ; Ambition and Pride ; Self-mastery ; Virtue and Vice.

2nd Part.—God the Spirit, The Son, and Lawgiver of the World ; Denying God ; Waiting for Faith ; Evil in the World ; The Person of Jesus Christ ; Principles of Christianity ; Example of Christ ; The Holy Ghost ; The Christian Church ; Death ; Immortality ; Prayer, and Blessing of it ; The Lord's Prayer in its internal connection.

SCRIPTURE KNOWLEDGE :—Principally learning passages from the Bible, and being able to answer word for word questions ; Must know concerning name, origin, arrangements, translation, &c., of the Bible ; Historical Books of Old Testament ; History of Israel ; Doctrinal, Prophetical, Apocryphal Books explained ; Historical Books of New Testament ; Short Outline of Christ's Life ; Lives of Apostles ; The Epistles.

BIBLE HISTORY is only taught up to Class III., and is then merged in Scripture History.

GEOMETRY :—Its History and Divisions ; principal stress is laid on calculating the areas of spaces and the volumes of bodies ; Elements of Geometry.

READING :—Must be able to read fluently, with proper accent and euphony, to be attained by a proper understanding of the subject ; Proper articulation. This is not to be confined to reading a few lines.

RECITATION from Memory of passages from standard authors, as also an Introduction to German Literature ; Extracts, prose and poetry, committed to memory, and a short account of lives of celebrated authors.

Form and contents of these extracts explained, as also the different kinds of poetry, and, as far as possible, in historical connection.

GRAMMAR :—Orthography and Syntax ; complex sentences with adjuncts. Explanatory and conditional adjuncts. Proper mode of forming sentences ; analysis of them out of books. Parsing ; Verbs ; Pronouns, &c., and other matters. Very carefully and fully taught, the language being difficult.

STYLE (Composition) :—Imitation in substance and form.

Difficult narratives, partly historical.

Descriptions.

Comparisons mostly of a realistic character. Changes in the forms of narratives, in conversation, &c.

Letters, Short poems.

Themes worked out.

Poetry turned into prose.

Letters, addresses, and forms used in business language.

ARITHMETIC :—Must work through and be complete master of Berthelt's Arithmetic up to the 5th and 6th chapters, *i.e.*, as far as Vulgar and Decimal Fractions, Rule of Three, and Simple Interest, &c.

HISTORY :—Greek gods and heroes. Roman history ; Romulus to time of Augustus and Christ's birth. Old German history ; Memoirs. The Wandering of the Nations ; Huns ; Constantine ; Mahometanism. From Charlemagne to the age of Chivalry. From Crusades to Present Time. French Revolution, &c.

"ANSCHAUNG" :—Teaching to observe, think, and to reason is the foundation of all German teaching. It is given in the two lowest classes by itself, and then merged in the different subjects taught. It is *the most important of all kinds of instruction, and forms the child's mind and develops his powers of observation.*

SINGING :—Notes, time, musical signs, all taught. Part

and choral singing. National songs taught in choral and two parts.

NATURAL HISTORY and PHYSICAL SCIENCE are taught in their outlines, and filled in as far as is possible in botany, mineralogy, and zoology. The forces of nature, magnetism, electricity, principle of gravity, centripetal and centrifugal forces are explained, and their relations.

GEOGRAPHY, and with it Astronomy. Physical geography and its relations to the heavenly bodies : special knowledge required as to that of the scholar's own country and State.

WRITING :—Every child must write with ease, fluency, and cleanliness in German and Latin characters. The excellence obtained is *most* remarkable, and to be realised must be seen.

GYMNASTICS are taught in every school. Each one has its hall attached with apparatus, and instruction is given by qualified teachers between other lessons.

THE PUBLIC MUNICIPAL SCHOOLS.—The “Fortbildung” schools before mentioned are adjunct schools attached to the district ones. They were founded by the law of 1873. “Fort” signifies continued, and “bildung,” culture. It is therefore a compulsory carrying-on of the education already given, for two years longer for four hours weekly in the same school in evening classes. Its object at present is not so much to carry on the education higher up, as to consolidate that already received, that it may not so easily be lost. It is entirely for children of the working classes, and is doing good service. Children who have gone into higher schools and have passed certain grades in them are absolved from compulsory attendance in these schools.

Before leaving the subject of these Elementary Schools, I subjoin the statistics of them for the whole of Saxony, taken from the report issued by the Department of State for Education. From them it will be seen that the system is so perfectly carried out as practically to do away with all private and other schools, there being as against 2,134 public,

only 99 private elementary ones, and in all Saxony only 88 tutors and governesses in private families. The schools in consequence are mixed in their character, as all public ones generally are, children of high and low, rich and poor, refined and vulgar, meeting together. This has its advantages, but also its disadvantages; it levels the lower classes up and exerts a refining influence on them, but it tends to level the higher classes down, and to lower the tone of refinement and feeling amongst them. Opinions differ as to whether this is compensated for by other advantages.

Stein, the great Prussian statesman, said, "What is put into the schools of a country comes out in the manhood of the nation afterwards."

These schools are moulding the future of the country for good or for evil. I do not hold them up to servile admiration in England; I am fully alive to their faults, but they certainly show that, educationally, the country is alive to its duty, and fairly performing it with success. The very uniformity of the system tends to one great fault, uniformity in the product, or a want of originality, one might almost say of freshness, in the mental characteristics of the rising generation. The system tends to repress individuality and to develop one type. The difficulty in teaching *religion itself* (not the things about religion) I have already pointed out; and the other point which seems to indicate some degree of deficiency is, in the formation of character, and this is partly the result of the two former. The want of personal independence of character and firmness of purpose has often been commented on, as a weak point, amongst the Saxons. They are "gemüthlich" or easy-going, and the percentage of suicides, which is greater in Saxony than in any other European State, seems to corroborate this, and points to a great moral fact.* The best minds amongst

* Another outcome of this system is well brought out by the following criticism of a learned Pastor, who has had much experience of Elementary Schools in Saxony, especially in the country districts. He says:—

The generation that is growing up is "Verzogen und Ungehorsam," spoilt

the leaders in educational matters are fully alive to all this, and are striving to provide remedies. These points, non-intellectual in their character, touch the moral side of human nature, and it is most difficult to come to any clear conclusion as to how far the system has succeeded or failed to accomplish the object set forth by the law of giving the pupils "the principles of moral-religious culture." That the system has succeeded fully in its other mission of giving them "the general knowledge required in daily life, and readiness in applying that knowledge," there is no doubt whatever, nor is it to be denied that, in the main, whatever of goodness, virtue, manliness, is to be found in the nation, is owing to its elevating and cultivating influence.

THE PUBLIC ELEMENTARY SCHOOLS.—NICOLAI SCHOOL.

The Nicolai School is a small elementary one, belonging to a suburb, and has three teachers, and may be classed as a district school, and is too unimportant to require further notice.

THE ROMAN CATHOLIC SCHOOL is an elementary one for the children of Roman Catholics, who numbered, in 1875,

and unmanageable; and one very prominent cause of it is the more perfect organization of the schools now as compared with thirty years ago. The classes now have forty or fifty pupils in each, and the instruction is divided up between different teachers. At 7 a.m., the bell rings, and the writing teacher appears; at 8 it rings again and he vanishes, and another teacher appears; at 9 religion is given till 10 by a third teacher; and lastly, from 10 till 11, something else by someone else.

What was it formerly?—the teacher had sixty in his class, and taught the class all subjects for five or six years, from 7 o'clock till 11, with certain intervals of recreation.

The latter teacher *knew* his pupils and was known by them, and he formed their characters. He was obliged to maintain discipline, or he could not have taught them at all; and often teachers who had eighty in class were more successful than those who had sixty on the modern more perfectly organized plan. With fewer pupils in each class the teacher cannot obtain that influence over them and insight into their character as in the older one. The constant change gives him no chance, and as he only has to maintain discipline for one hour, and he does not require to develop the higher powers required to master and control sixty or seventy pupils all the day.

The Pastor, therefore, strongly advocates that for the first four years at least, in Primary Schools, the four main subjects should be given by one and the same teacher, and only special subjects by teachers—but he does not advise the classes being enlarged beyond their present size.

2,085, and who object to use the Municipal Schools. This school has three teachers, and is under a committee of four Catholics and the priest, who is also Local School Inspector, and gives the religious instruction as well.

I close this first division of my subject with the following :—

STATISTICS OF THE ELEMENTARY SCHOOLS, DEAF AND DUMB INSTITUTION,
AND PRIVATE SCHOOLS, ON DECEMBER 1ST, 1878, IN SAXONY.

	Number of Schools.	Number of Pupils.	Number of Classes.	Number of Teachers' Places.	Number of Actual Teachers (Active).*		
					Male.	Female	Total.
Public Elementary Schools	2,134	451,324	9,663	5,649	5,396	1,424	6,820
Fortbildungsschulen	1,866	68,604	2,621				
School at Bodenbach	1	69	2				
Special Seminary Schools	17	1,919	69				
Deaf and Dumb Institutions	2	301	25	29	33	6	39
Private Elementary Schools sanc- tioned by State..	99	7,575	—	—	265	331	596
Ditto Fort- bildungsschulen	10	1,251					
Private Teachers & Governesses in Houses	—	—	—	—	18	70	88
	4,129	531,043	12,385	5,678	5,712	1,831	7,543

* Including 1,296 Needlework (Female) Teachers.

SUMMARY OF ALL THE SCHOOLS IN SAXONY UNDER THE MINISTER FOR EDUCATION AND CULTUS IN DECEMBER, 1878.

Population of Saxony 1st December 1875,
was 2,760,342.

	Number of Schools or Institutions.	Number of Pupils and Scholars.	Number of Classes.	Number of Teachers.	Amount of Teachers' Salaries.	Total Amount of Expenses of Schools.	Amount of State Aid.
					£ s.	£ s.	£ s.
1. University (Leipzig)	1	3,172	—	165	22,773 0	58,250 7	33,916 14
2. Polytechnic (Dresden)	1	672	—	43	7,817 6	13,231 4	11,332 8
3. Gymnasiums	13	4,063	147	284	43,635 14	65,249 15	19,114 13
4. Real Schools of Class I.	12	3,525	151	239	39,434 3	38,350 0	8,499 9
5. " Class II.	20	2,884	131	215	21,739 19	31,633 19	7,842 14
6. Seminaries	18	2,600	114	269	31,247 3	47,831 23	42,303 6
7. Institute for Drawing, Gymnastic, Teachers	1	14	—	4	371 12	716 0	498 7
8. Higher Girls' School (sanctioned)	1	734	27	35	3,789 19	5,438 19	—
9. Amount of Pension granted to Teachers of Higher Schools	—	—	—	—	—	4,577 10	charged under 11-13. p
10. Higher (Secondary) Private Schools	4	645	30	63	?	p	—
11. Fortbildungs schulen	1,866	68,604	2,621	6,820	*192,384 15	*687,392 12	*64,855 12
12. Public Elementary Schools	2,134	451,324	9,668				
13. School at Bodenbach	1	69	2	—	—	—	—
14. Special Seminary Schools	17	1,919	69				
15. Deaf and Dumb Institutions	2	301	25	39	3,751 10	8,909 12	7,072 16
16. Private Elementary Schools	99	7,575	p	596	p	p	—
17. " Fortbildungs	10	1,251	p	88	p	—	—
18. Private Teachers and Governesses in Houses	—	—	—				
	4,201	—	—	—	—	—	—
		549,372	12,985	8,860	£657,944 11	£961,581 11	£195,435 19

* Excluding the Salaries and Expenses of the Deaf and Dumb Institute, but including the Pensions to Teachers in the Higher and Elementary Schools from the State.

PART II.

TECHNICAL EDUCATION.

THE next part of our subject, the Technical Schools, though in many respects the most interesting, is the most difficult to do justice to. On the other hand, it is one which in a large manufacturing town requires careful attention. Elementary and secondary education compel attention of their own accord, not so, however, Technical Education, which requires some external pressure, either from foreign competition or other causes, to secure from the public that attention which is essential to the proper discussion of the whole question. The description of the industries of the district, at the commencement of this paper, will give the reader some idea of what is required to educate the future manufacturers, managers and workmen, in the various branches of their trades, and to enable them to hold their own, as against competing industries, in other countries,* and in the following pages I shall try to give the reader some idea of what has been accomplished in Chemnitz to facilitate this object.

THE STATE TECHNICAL EDUCATIONAL INSTITUTIONS.

The State Technical Educational Institution might almost be described as a technological college, but it is, strictly speaking, an aggregate of technological schools. From

* On the importance of this subject, and its bearing on the development of special industries, the reader will do well to study a valuable and interesting pamphlet, by Professor S. P. Thompson, of Bristol, entitled, "Apprenticeship Schools in France." (Hamilton, Adams & Co.)

small beginnings it has developed into one of the most important institutions in Saxony and central Germany. Originally a school for teaching mechanical technology only, it has developed, first under the fostering care of the late Dr. Hülse and of Professor Böttcher, who is now in one of the departments of State in Dresden, and later on under that of Professor Dr. Wunder, into an institution of first rank, and I feel myself quite unequal to the task of conveying to the reader's mind an adequate idea of the education which is to be obtained in it, or of the advantages which a young man has who attends its courses, if he only makes proper use of them.

The old apprenticeship system having become obsolete and gone overboard for ever, and scientific or technical knowledge being now required in all branches of manufactures and in many trades, institutions like these are become an absolute necessity if any country intends maintaining its position at the head of the industries of the world. More especially is this the case with England, which has now to fight the battle of free trade single-handed against the protected industries of the Continent and America. The reader must not think that the Institution now to be described is an exceptional one of the kind in Germany. Such have existed in all the chief centres for many years, and continue to enlarge their courses of instruction in new magnificent buildings. Those at Berlin, Munich, Hanover, Augsburg, Karlsruhe, Stuttgart, Dresden, are justly celebrated, and are severally attended by many hundreds of students. New institutions keep springing up, and the old Welfen Schloss or Castle at Hanover, one of the finest buildings in that city, has just been acquired and adapted at a total cost of about £225,000 for the use of the Technical High School there, and was opened not long ago. A magnificent institution of considerable architectural pretensions was also opened about a year ago at Aix-la-Chapelle. Both of these, judging from pictures, are even more extensive than the one in Chemnitz. This work is going on all over Germany, and the future

merchants and manufacturers are being taught the principles upon which their industries are based, and the natural and applied sciences, a knowledge of which is essential to their working in a methodical and scientific manner, instead of their being left to pick them up haphazard in the workshop, factory, or dyehouse. This is owing to a clear apprehension of the fact that the old apprenticeship system, founded on manual labour, having finally broken down, something must be provided to take its place. In Germany, that something is this system of Technical Education, and it is astonishing how rapidly it has progressed during the last twenty years, and with what thoroughness it is being carried out. Dr. Thompson, in the pamphlet before mentioned, refers to this, and says that "in an article which appeared in the *Contemporary Review* in 1876, Mr. George Howell has drawn a vivid picture of the decay of the apprenticeship system," and as Dr. Thompson justly remarks, "he has done more, he has given a careful analysis of the existing conditions of apprentice labour for all the most important industries of the country, reviewing those conditions chiefly from the point of view of the rules of Trades' Unions, and of the technical training of the apprentices. Any person who is disposed to dispute the nature of the connection between the depression of trade in the skilled industries, and the question of Technical Education, has only to refer to Mr. Howell's masterly article, to realize how intimate in its nature that connection is, and to learn how utterly helpless it is on the one hand to expect that the system of apprenticeship we have inherited from the past can afford a technical training to the skilled artizan, and on the other, how utterly futile must be any attempt to galvanize that system into life." *

* From article in *Contemporary Review*, 1876. Mr. G. Howell.

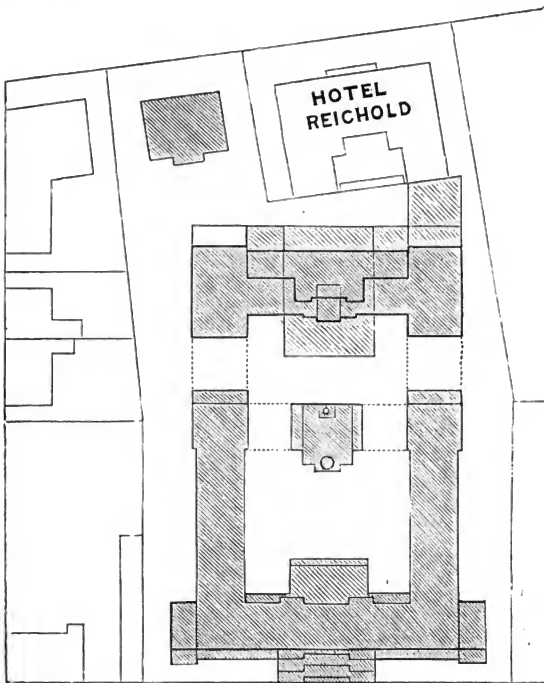
"In the olden times the employer was also a workman; he had himself learned his craft and understood it so as to be able to teach it to another. The question, therefore, as to taking apprentices rested with himself and with the parents or guardians of the intended apprentices. Usually they were received into the family, they were fed and clothed, and slept in the houses of their masters, being in fact domestic apprentices, at a time when many of the industries of the country were chiefly domestic trades instead of being carried

This technical education is being accomplished in Chemnitz and the district by this State Institution, in conjunction with the special Technical Schools for the weaving and hosiery trades, and excepting one important deficiency, which will be referred to later on, covers pretty much the whole ground, and affords a young man every opportunity after he has left school to prepare himself to enter any one of the industries of the town and neighbourhood.

BUILDINGS.—The new buildings in which these schools are located were completed in October, 1877, and are situated on the Schiller Platz, not far from the railway station; the finest and most suitable site in the town. They comprise two massive buildings, each four storeys high; the main one fronting the Schiller Platz, with two wings running from it to the back, on each side, contains the general school, with the Royal Foremen's and Building Schools. The Laboratory at the back, also a four-storeyed building, runs parallel to the main one, and contains the chemical technological school: together they form a square, the middle of which is a large court, laid out

on by great firms and in such large establishments as we now see. But a change was coming o'er the spirit of the dream, another day was dawning, fraught with still greater issues to the journeymen, for instead of the old system of mastership and craftsman, there grew up quite another kind of mastership and of hiring. The master had already begun to be less the craftsman and more of the employer. Capital was fast becoming the great motive power. Streams were first utilized, then steam; complicated machinery was being substituted for hand labour in many of the growing industries of the time; the master no longer worked at the trade himself—he directed and found the capital. The number of persons employed was also greatly augmented; instead of the old fealty between master and men there came estrangement more and more, until sometimes the workpeople scarcely ever saw their veritable employer. Under these circumstances the conditions of apprenticeship were completely changed, not suddenly, but gradually, until the apprentice became merely the boy worker, with less wages but more solemn engagements than a journeyman. The master to whom he was bound no longer taught him his trade; he was, so to speak, pitchforked into the workshop to pick up his trade as best he could, or to learn it from the many journeymen who were there employed. It was no one's duty to teach him: there was no pay and no responsibility. And it must be remembered that it formed no part of the journeyman's contract of hiring or of service to teach the master's apprentices; it was his duty to work, not to instruct, to perform his own labour, and not to give his own labour and the mysteries of his craft to a stranger for no recompense or reward, unless, indeed, it was the prospective reward of being shouldered out of the workshop by the very boy to whom he had imparted all his knowledge and skill."

in grass-plots and garden beds, and in the centre is the main chimney with its boiler house, communicating underground with the steam, heating, ventilation shafts, &c. of both buildings and wings. The following plan shows the position of the buildings.



No doubt, in time, when the need is felt, the Hotel Reichhold and land on which it stands will be acquired for the Institutions, thus giving them a double frontage, —the present one to the Schiller Platz, and the other on

the Albert Strasse, facing the new railway station. The cost of these buildings was :—

Land	£14,700
Main building	42,521
Laboratory	20,019
Chimney and Boilers, &c.	4,703

£81,943

And they contain space and rooms as follows :—

	Main Building.		Laboratory.	
	No. of Rooms.	Space in Sq. Metrs.	No. of Rooms.	Space in Sq. Metrs.
Souterraine	13	600	15	560
Ground floor	18	} 5,460	12	} 2,270
First storey	21		11	
Second „	19		10	
Third „	9		2	
Total	80	6,060	50	2,830

making a total of 130 rooms, including cellars, and 8,890 square mètres of space, excluding corridors, staircases, passages, &c. The main building I need not further describe, as the accompanying engraving of the front will give the reader an idea of its general style and character, and the plans of each storey show the arrangement of class rooms, &c.



ROYAL TECHNICAL INSTITUTION, CHEMNITZ.

Each room is numbered, and by referring to the list of rooms, it is at once seen what each is used for, and a few minutes' study of these plans, with the list attached, will give a good idea of the internal arrangement of the place. The same remarks apply to the laboratory, of which I give a sketch, with the inner court, and plans of each storey, with list of rooms. The class rooms are large, airy, and well lighted; and the corridors and main staircases are large and handsome: almost palatial in character. Water is laid on in every room, and the corridors as well as rooms are all heated by steam, and ventilated on the well-known system of Sulzer Bros., in Winterthur. In the centre of the court is the boiler house, and from thence the steam is conveyed in pipes to each building. The steam is taken up to the top storey first, and descends to the lowest in its course, taking with it the waste water. In each room, as its size may require, are one or two large circular stoves, about $2\frac{1}{2}$ feet in diameter and 8 feet high; the steam pipes coming from the outside are coiled round and round inside these, which are half filled with water. The steam enters at the top and goes out at the bottom, heating both pipes and water. At the bottom of the stove there is a current of fresh air, introduced from the corridor outside; this passes through the stove and is warmed before entering the room. At the top of the room there are two ventilators, one on each side, which draw off the bad air through the chimney draft; there is thus constantly a passage of air through the room; it enters at the bottom of the stove, is warmed, and passes out at the top through the ventilator.

The class rooms are all so arranged that the light comes in from the left-hand side. Each school has a special room containing its own sets of machines, models of machines, and parts of them, collections of appliances, materials, &c., both for the mechanical and architectural divisions, and these form the nucleus of a museum of mechanical and building appliances. Amongst other things in the mechanical museum room is a beautiful miniature locomotive, made and presented by the late Mr. Hartmann as an acknowledgment of his

appreciation of the value of the Institution. It cost over £1,000. There are suites of rooms for the Director and teachers ; and on the ground floor three or four rooms are filled with an increasing and valuable technical library, to which a reading room is attached, available at suitable times to the general public. On the upper storey is the "Aula," or theatre, as it would be called at Cambridge, a handsome lecture hall, used only on special occasions. It is used at times by scientific bodies in the town and for public lectures of a scientific kind.

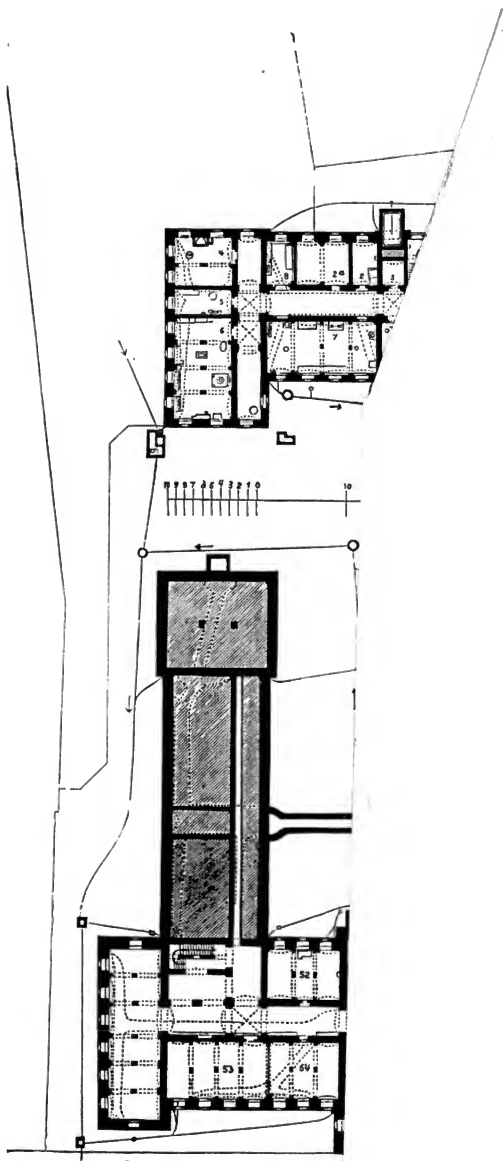
LIST OF ROOMS IN MAIN BUILDING.

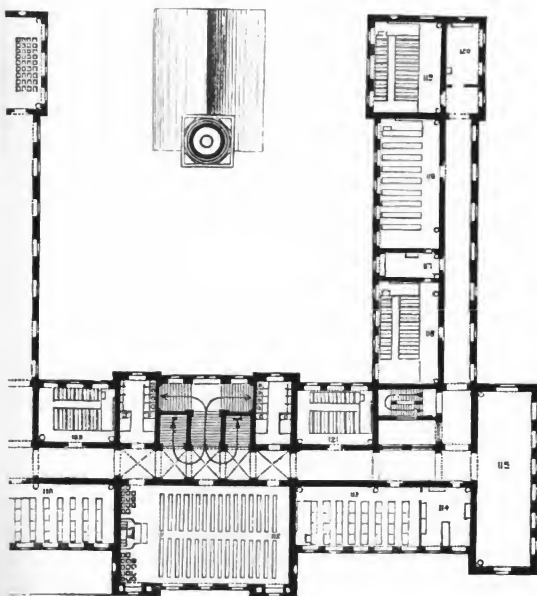
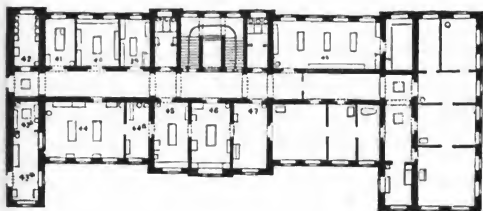
Souterrain.

51 to 63. 13 cellars, workrooms, washhouse, engine-house for gas motor, &c.

Parterre (Ground Floor).

- 64. Lecture room for Course 3.
- 65. " " " 2.
- 66. Room for Teachers (private).
- 67. Drawing room. Course 2.
- 68. " " " 1.
- 69. Museum of architectural models, casts, &c.
- 70. Lecture room. Course 1.
- 71. Teachers' room.
- 72. Librarian's "
- 73. Reading "
- 74. Room for maps and works of art.
- 75. " Library.
- 76. Lecture room. Course 1.
- 77. Cabinet for teachers.
- 78. Drawing room. Course 1.
- 79. For geometrical instruments and objects, &c.
- 80. Cabinet for teachers.
- 81. Lecture room. Course 1.





SECOND FLOOR.

First Storey.

- 82. Modelling room.
- 83. Drawing „
- 84. Teachers' cabinet.
- 85. Drawing room. Course 3.
- 86. Combination room.
- 87. Workroom with models, &c., for G. S.
- 88. Lecture room. Course 1.
- 89. Conversations class.
- 90. Director's room.
- 91. Bureau.
- 92. Conference room.
- 93. Archive „
- 94 and 95. Lecture and drawing room. Course 3.
- 96. Workroom, &c.
- 97. Lecture room. Course 2.
- 98 and 101. Teachers' cabinets.
- 99 and 100. Lecture and drawing rooms. Course 2.
- 102. Technological museum.

Second Storey.

- 103 and 104. Lecture rooms. Course 2 and 3.
- 105. Conversation class.
- 106. Drawing room. Course 2.
- 107. Combination room, also for the entrance examinations.
- 108 and 108*b*. Drawing and lecture room. Course 2.
- 109. Teachers' cabinet, &c.
- 110. Drawing room. Course 3.
- 111 and 112. Aula.
- 113. Drawing room. Course 3.
- 114. Workroom and teachers' cabinet.
- 115. Meeting room.
- 116. Lecture room. Course 1.
- 117 and 120. Teachers' cabinets.
- 118 and 119. Lecture and drawing room. Course 1.
- 120. Lecture room. Course 3.

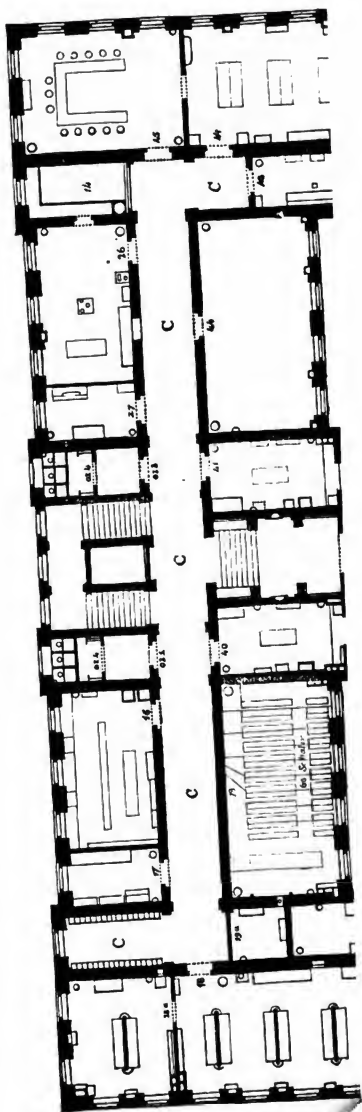
Third Storey.

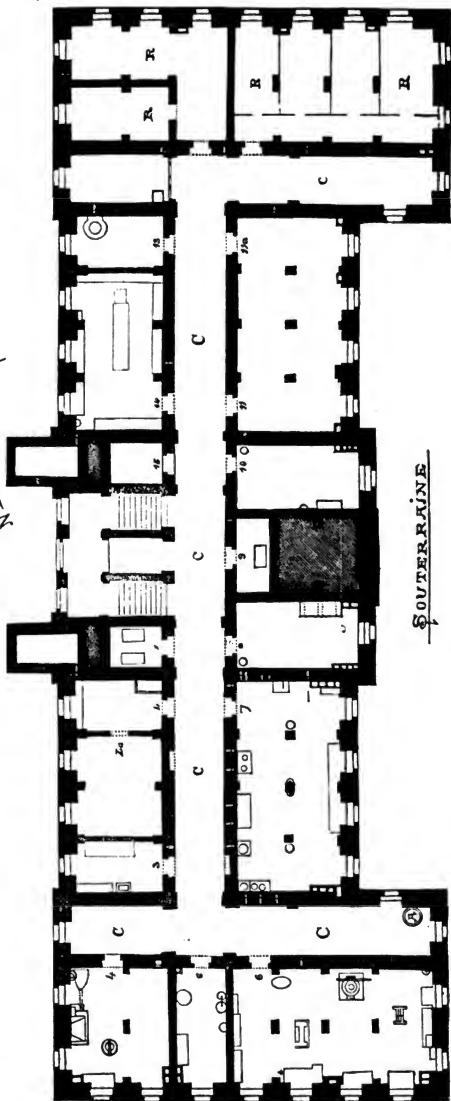
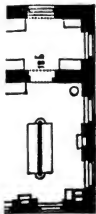
- 122 and 123. Rooms for exhibitions, &c.
 124. Rooms for modelling instruction.
 125. „ „ casts and drawing from cast.
 126 and 129. Drawing room and cabinet for examples.
 127 and 128. Gallery to Aula.
 130. Reserved room used by a local museum.
 Lavatory for school, servants, &c.

BUILDING FOR LABORATORY.—The Laboratory, most elaborately and, technically speaking, most luxuriously furnished, is in many respects the more interesting building of the two. The plans annexed will give a clear idea of its arrangement, as well as of the thoroughness and care with which every detail has been studied. By many competent judges it is considered a model institution, and, for its size, the most complete in its appointments in Germany. It is fitted up with every chemical apparatus and instrumental and mechanical appliance which the most completely appointed laboratory can be expected to possess; and during its erection several of the professors were sent to various countries to study similar ones and their experience was made available. Dr. Weinhold, Professor of Physics, spent sometime in London during the late exhibition of philosophical and scientific instruments, and visited all the best laboratories there. Other Professors went to Paris and Vienna, and neither expense nor pains has been spared to enrich it with every modern appliance. In the lecture rooms for general chemistry and physics, gas, hot water, cold water, steam, and a powerful electrical current, are all laid on and at the lecturer's constant disposal, and by turning a tap or cock at once available; by pressing a knob the shutters go up and the room is darkened. Next to each lecture room and communicating with it at the back of the lecturer's demonstrating counter, is the professor's work room, and here travels on rails between the two a moveable table, so that the necessary experiments can be prepared beforehand in the work room. The door can be



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opened and the table is pushed in and stands ready for use at his side. In the souterraine (vaulted) are the necessary rooms and appliances, retorts, &c., for working with fire. A gas motor is fixed in one and works the electrical machine with which the whole place is supplied with a current, and this can be set in motion any moment. In a suitable place in the building a space about 15 square feet has been left free, through the whole height of the building; in this the Professor of Physics has hung his earthquake pendulum and other appliances connected with his special science. There is a museum room for each department, viz., general chemistry, technical chemistry, mineralogy, and physics, and these four rooms are arranged with the respective lecture and work rooms *en suite*, so that the professor and students can at once obtain any specimens required in the courses of study.

LIST OF ROOMS IN THE LABORATORY.

Souterrain.

1. Room for gas meters.
2. & 2a. Rooms for stocks of materials.
3. Rooms for galvanic batteries.
4. „ working with fire.
5. „ apparatus heated by steam alone.
6. Mechanical work room.
- 7 & 8. Rooms for working with fire.
9. Rooms for photometrical experiments.
10. „ analysing gases.
11. „ coals, &c.
12. „ earthquake pendulum.
13. Wash kitchen.
- 14 to 15 *b, c*, &c. Rooms for utensils, &c., &c.

Parterre (Ground Floor).

16. Room for stocks of chemicals.
- 17 Museum for general chemistry.
18. Workroom for pupils of first course.

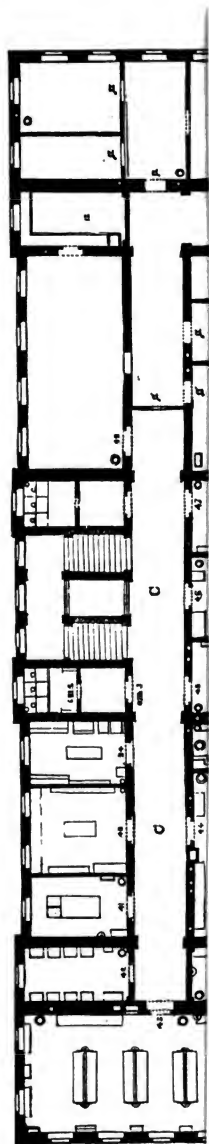
18. *a* & *b*. General experiments room to above.
19. Lecture room—general chemistry.
20. Workroom for professor general chemistry.
21. „ „ a teacher.
22. Not used.
23. Work room—teacher of mineralogy.
24. Museum.
25. Lecture room „ „
26. Room for exact experiments and work.
27. Waiting room.

First Storey.

28. Museum for technical chemistry.
29. Workroom for pupils Foremen's school.
- 29*a*. „ teacher „ „
- 29*b*. Experiments „ generally, Foremen's school.
- 29*c*. Room for spectrum analysis.
30. Lecture room for technical chemistry.
31. Workroom for assistants for physics.
- 32 & 33. „ teachers of „
34. Lecture room for physics, Foremen's school.
35. Preparation „ to above.
36. Lecture „ physics—technical school.
- 37 & 37*b* & 38. Museum for physics.

Second Storey.

39. Lumber room.
40. Room for apparatus.
41. Workroom for assistant for chemistry.
42. Weighing room.
43. Workroom for pupils.
- 43*a*. Room for elementary analysis.
- 43*b*.
44. General experimenting room for pupils of 2nd and 3rd courses—technical school.
45. Microscopical, &c., room.



46. Workroom for the teacher, technical chemistry.
 47. Study " "
 48. Museum, physics, dwelling for teacher, &c.

STATE TECHNICAL EDUCATIONAL INSTITUTIONS. — These buildings contain the following schools, comprised under the name of

THE STATE TECHNICAL EDUCATIONAL INSTITUTIONS.

<i>a</i>	The Higher Technical School with 153 students.				
<i>b</i>	"	Royal Building	"	"	170
<i>c</i>	"	"	Foremen	"	230
<i>d</i>	"	"	Drawing	"	111

Total 664

Less entered twice over 12

Total 652

in 1869; and the staff at the same time consisted of

1 Director,
 1 Vice-director,
 10 Professors,
 22 Head masters,
 5 Assistant masters. Total 39.

And 13 clerks, laboratory assistants, &c.

Each school has different aims, to be described later on. The students live either at home or in lodgings, and attend the lecture classes, laboratory, &c., at the hours fixed in the school plan. They are under the supervision of the director and masters during school hours only. They have much work to do at home, and if anxious to do it conscientiously, they must study hard, and find all their time fully occupied. Any improper conduct out of school hours, coming to the knowledge of the masters, is at once reported to the parents or guardians. It depends almost entirely on the ability, diligence, and working capacity of each student what use is made of the education here given. If diligent and fairly capable, his success is sure; if idle, he will soon have to leave, it being a general rule, *that if any student, after remaining in the same "course" for double the usual time, is still unfitted to enter the next higher one, he must leave altogether.*

Pupils, not natives of Chemnitz, can obtain board and

lodging in suitable families recommended by the director, and often in the families of teachers themselves, at an expense varying according to the comforts required, from £25 to £45 a year.

The courses of instruction are so arranged in classes that there is no loss of teaching power. Though the divisions in the higher technical school are clearly marked, the instruction is combined in certain subjects which form the groundwork of all. It is only when the students are sufficiently advanced that the instruction becomes special, and branches off. The result is economy of teaching power combined with efficiency, the distinct objects which each school aims at attaining being kept constantly in view.

The main school is, of course, the higher technical one, with its three divisions, mechanical, chemical, and architectural, and is the backbone of the institution. The reader must not think it is a sort of popular mechanics' institute, with a fine large music-hall and one or two small class-rooms underneath, and a natural history cabinet attached, where *dilettanti* pupils attend a few evening classes in the hope of finding a royal road to scientific knowledge. On the contrary, it is a place of real hard study, and good work is being done in it both by masters and students. There is nothing amateur about it, but everything is done thoroughly. For this there are several guarantees. First, the pupils. I refer now specially to those attending the higher technical school, who are broken into work before they enter, the conditions of entrance being so onerous that only those who are trained and accustomed to intellectual work can obtain admittance. Then, the students feel that their future career is entirely dependent on the result of the efforts they are making, and that the character of the certificate obtained on leaving will have an important bearing on their chances of remunerative employment when they enter practical life; and lastly, the rule before referred to, that any student remaining in any one course double the usual time without being qualified to enter the next higher one must leave the school,

acts as a stimulus to industry, and keeps the young men seriously to their work. Scientific and technical instruction can only be carried higher up, step by step, as the pupil is perfectly grounded and has mastered his subject. He cannot, therefore, in an organised system, such as prevails in this school, be transferred from a lower to a higher course unless the lower one is "passed." Hence the efficacy of the above rule, which effectually keeps both teachers and students "up to the mark." At Easter and Michaelmas the pupils receive a "censur" or report on their behaviour, attendance, industry, and attainments, and only such as obtain in *all subjects* at least "sufficient" can enter on the next course. On finally leaving, they receive a summary of these, which at once stamps the student's position, besides giving the number of absences from classes. Thus a young man applying for a situation in some machine-building establishment would say: "I have gone through the higher technical school at 'Chemnitz,'" and would produce his final certificate or "censur," and if he did not do so, he would be asked for it. This, if a good one, and if he had gone through all three courses with success, would, at any rate in Germany, be a first-rate recommendation, as it is expressly stated in the certificate that he has accomplished the "Lehrziel" or object contemplated by the school. That this is really accomplished is proved by the fact that the greater number of pupils who do enter go through the three courses, and remain till they have passed the last one.

The higher technical school affords, says the prospectus, through its systematically arranged courses of instruction, 'combined with experimental work, the means of scientific education to those who intend to devote themselves in "practical life to one of the mechanical or chemical industries, or to the profession of architect."

According to the calling the pupils may have chosen, instruction is given in three divisions,

The mechanical technological school for future manufacturers, technical managers, "technickers" in the

different branches of the machine-building, spinning, weaving, and other similar industries.

The chemical technological school for the same classes of persons in the various chemical industries.

The architectural school for future architects.

Instruction in the general sciences and in languages is given to the pupils of all three divisions together; on the other hand, in those subjects which take a particular direction and lead to special industries, it is given only in the particular division. Agreeably with this, the instruction in the first "course" is mostly for all together; while in the second and third "courses" the students are divided off according to their future calling. This will be clearly seen by studying the plan of the "courses" of instruction given later on.

The 1st course of all three divisions comprises 3 half-years.

"	2nd	"	"	"	2	"
"	3rd	"	of the two first divisions	"	2	"
"	3rd	"	" architects	"	1	"

THE HIGHER TECHNICAL SCHOOL.—Students in the architectural division must after their first half-year give a summer half-year in practical work in some building occupation, and also have done the same for half a year before entering. The three courses in all the divisions require therefore about $3\frac{1}{2}$ to $4\frac{1}{2}$ years to be gone through. Pupils must be at least 15 years of age and have the sanction of parents or guardians. Students attending only special classes must give satisfactory proof that their time is fully occupied.

In order to enter the first course, students must have received an education enabling them to pass the upper-second class of a gymnasium or real school of first order, and this can be proved by the production of the one year volunteer certificate, or by the student undergoing an examination on entrance. Students entering in the first course when partly over, or in a higher one, must give proof that their previous acquirements qualify them to take part in the instruction given. At Easter and Michaelmas the students leaving, can

obtain a certificate of their acquirements, and if they have passed through the third course with success, a testimonial to that effect that they have accomplished the full object the institution professes to attain. The institute is also empowered to grant the one year volunteer certificate to any student qualifying who had not previously obtained it. Older persons in independent circumstances can obtain permission from the Director, in conjunction with the particular teachers, to attend special courses of lectures. They are called "Hospitanten," and are not under the general laws of the institution, and can obtain, if desired, on leaving a certificate stating what classes and how long they have attended. The right, however, is reserved to withdraw this permission at any time, if circumstances seem to require it.

The school fee in all divisions and "courses" is alike, viz., 60 marks or £3 per half-year.

Worthy pupils without means can obtain a remission of the fees. The cost of books, drawing materials, &c., amounts to about 40s. or 50s. a year. The following is

THE PLAN OF INSTRUCTION OF THE CLASSES.

A is the division for students of the Mechanical Technological School. B is the division for students of the Chemical Technological School. C is the division for students of the Architectural Technological School.

FIRST COURSE. 3 HALF-YEARS.

	Summer First half.	Winter Second half.	Summer Third half.
	Weekly hours.	Weekly hours.	Weekly hours.
German language ...	3	3	3
Descriptive geometry ...	A { 4	A { 4	A { 4
Mathematics ...	B { 8	B { 8	B { 7
Physics ...	& { 4	& { 4	& { 4
General chemistry...	C { 4	C { 4	C { 2
Freehand drawing...	4	4	
Art of building and archi- tectural drawing ...	...	A & B { 6	A & B 6
Preparatory exercise in architectural drawing ...	C { 4		
Instruction in building materials... ..	2		
Freehand drawing...		C { 4	C { 4
Art of building and archi- tectural drawing ...	...	C { 4	C { 4
Construction of buildings...	...	4	6
Descriptive geometry ...	...	...	A & C 4
Coloured drawings of machines and geometrical bodies ... ..	...	...	A { 4
Practical geometry ...	...	...	{ 1/2 a-day
General chemistry...	...	...	B { 4
Practical chemical work in laboratory ... ..	...	...	8
Further, the following sub- jects are taught but not obligatory :—			
Geography	} all 3	3	
History	} for ...	...	3
Mercantile arithmetic	} A B ...	...	2
French	} & 3	3	3
English	} C 3	3	3

SECOND COURSE—2 HALF-YEARS.

	Winter. First half- year.	Weekly hours.	Summer. First half- year.	Weekly hours.
German language and literary history ...	A	2	A	2
Physics	B	2	B	2
	&		&	
Chemical technology	C	2	C	2
Mathematics	A	8	A	8
	&		&	
Descriptive geometry	C	4	C	
Mechanics		4	A	4
Machine drawing	A	6	A	6
			Art. of Mach. Build., A	4
Practical geometry		2		2
Technological chemistry (inorganic)... ..		2		2
Analytical " " " " " " " " " "		2		
Practical " (working in laboratory)		16		16
Mineralogy	B	4	B	4
Mechanics		2		4
Machine drawing (parts of machines and models)		2		4
Mechanics of the construction of buildings...		2	Science of Mechan.	2
Art of building		2		
Designing plans of buildings	C	8		10
Freehand drawing		2		2
Styles of architecture (columns, &c.) ...		2	C	
History of " " " " " " " " " "		2		
Railway, roads and waterworks, aqueduct construction... ..				2
Practical geometry				day
Further, the following subjects are non- obligatory :—				
History	A	3	A	3
Bookkeeping and correspondence	B	2	B	2
French	&	3	&	3
English	C	3	3	3

THIRD COURSE—2 HALF-YEARS.

	First half.	Second half.
	Hours per Week.	Hours per Week.
FOR ALL PUPILS A B & C.		
German language... ..	2	2
Mechanical technology	4	4
FOR A & B.		
Political economy... ..	4	4
Metallurgy	2	...
FOR A ALONE.		
Mathematics continued to analytical geometry...	4	4
Mechanics	2	...
Art of building machines... ..	4	4
Machines of various kinds	4	4
Construction of machines, and plans of parts and the whole	12	12
FOR B ALONE.		
Physics	2	...
Technological chemistry (organic)	2	4
Practical „ work in laboratory	16	16
Machine drawing... ..	2	4
Machinery in general	4	2
FOR C ALONE.		
“ Propädieantik ” of political economy	2	...
History of sculpture and painting	1	...
Legal building regulations	1	...
Heating and ventilation	2	...
Freehand drawing	2	...
Decorative ornamentation	4	...
Preparation of estimates	2	...
Designing plans of buildings	14	...
Further non-obligatory subjects :—		
French	2	2
English	2	2

The pupils attending the architectural school have further the opportunity of attending during the second half-year in the second course, and during the third course, the following classes in the Foremen's School, according to choice :—

Classes for instruction in building mills for corn,	} See Royal Foremen School Course.
sawing, powder, &c.	
Spinning in cotton, flax, wool, cashmere, &c.	
Weaving " " "	
Paper manufacturing	
Tool-building for machinery	
Brewery mechanics	
Finishing apparatus, &c.	
Waterworks	
Fire-extinguishing apparatus	

Pupils in the upper course of the architectural division are allowed to attend the modelling classes in the Royal Drawing School.

Most of the pupils in this higher technical school stay all through the three courses till they have obtained a fair certificate. They enter when about 16 or 17, as before that age they have not finished at the gymnasium or real school, and remain about $3\frac{1}{2}$ to $4\frac{1}{2}$ years. This brings them to about 21. Their military duty has then to be performed, and then they enter into active life.

Respecting the architectural division, it may be remarked that its object is to educate architects for ordinary building purposes. In Dresden there is the Architectural Academy, with higher aims, in which the students make a purely academical course, which qualifies for the State examination. The Chemnitz School does not attempt this, and has purposely kept a lower aim in view, in order not to clash with Dresden. In Dresden the students must have completed the real, or gymnasial course before entering, and consequently are about 20 years old. The course there is five or six years, so that a young man who completes this

course is 25 or 26 years old before he can begin *practical* work. The Chemnitz' less ambitious course is finished at 20 or 21. This is followed by the one year's military service, at the conclusion of which the young man can enter his profession. If, however, he wishes it, a student from Chemnitz can leave, and enter the second course at Dresden, and so go on and complete his education there, preparing himself to be an architect of monumental works and buildings of high art. The Chemnitz School is sufficient, if made proper use of by the student, to start him fairly in an ordinary town.

The higher technical school proper we have now done with, and turn our attention to the adjunct, viz., the Royal Foremen School.

THE ROYAL FOREMEN SCHOOL has for its object to give to future machinists, millers, dyers, bleachers, tanners, brewers, soap, sugar, and chemical manufacturers, &c., as well as to such young men as intend becoming foremen and managers in weaving and spinning mills, machine building establishments, &c., the opportunity of obtaining the theoretical knowledge required in their future career.

The instruction is comprised in three continuous "courses" of half a year each, together $1\frac{1}{2}$ years; and in this relatively short time the pupils acquire only what is particularly necessary in their practical occupations. This school has not for its object to give an extended scientific culture.

According to the profession of the pupils, the instruction is given in two divisions, each completely separated. For machinists, there is a mechanical division; for chemical workers, a chemical division; and only in some general subjects, such as freehand drawing, German language, book-keeping, are the courses combined, and then in so far only as the number of pupils may permit. The conditions of entrance are, that the students must be 16 years of age, and be sufficiently educated to be able to read, write, and reckon in the four rules of arithmetic fluently and accurately. The

education of a district school in Chemnitz would be practically sufficient. A very important and additional condition is that the pupils must have worked in their trade or calling *practically* for at least two years before entering.

The students are required to give their whole time to their school work, and have plenty of preparation to do at home. They are under the general laws of the institution. The fees are 30 marks, or 30s. for each course, besides expenses of materials, amounting to about 15s. Worthy, but poor students, can not only obtain a remission of fees, but in special cases are helped by pecuniary assistance from the State. This school is one of the most important in Chemnitz, and is, as its name implies, for the sons of the poorer classes, and not of the wealthy. The condition that each pupil shall have worked two years at his occupation before entering, gives the keynote to the idea which led to its foundation, viz., the giving the necessary theoretical knowledge to such capable industrious young workmen in manufacturing firms as will enable them to become foremen, and in time, if they show real capacity, practical managers, &c. A lad, say, at 14 leaves the district school, and goes to Hartman's or Zimmermann's Machine Building Establishment. He works as an apprentice, and attends at the same time the evening "Fort-bildung" School. His master sees he has a talent for mechanics, is industrious and anxious to learn. After two or three years, as it may suit employment in the workshop, he is sent to the Foremen's School, and is taught the theory and principles of that which he has seen in practice; and if he takes due advantage of his instruction, he is fitted to become a foreman, possibly ultimately a manager, or even more. It forms the necessary link which enables a young man who has the stuff, as they say, in him to raise himself to a higher position, and to secure for himself his rightful place in the social scale. It also benefits the country by bringing out of the common ruck the more valuable and rarer ability to be used for the benefit of the particular industry. Further, it keeps the industries of the district and country well

supplied with a class of men, between the common workmen and the masters, who are absolutely necessary here in securing the success of any industry, for the "hands," or working men, require much more supervision and direction here than in England.

This Royal Foremen School is almost unique of its kind in Germany. Fifteen years ago Professor Bottcher told me that at that time he believed it was the only one existing, but it is possible that since then others have been established.

The courses of instruction are quite distinct from those of the higher technical school, and are given in separate classes and class-rooms. The school has its own collection of machinery and models, and in the chemical division, of scientific instruments and apparatus. The class of pupils is socially also quite different from that attending the higher technical school, and does not come into contact with them. Many who attend do not get beyond the second course, being obliged to go through the first and second courses (one or both) twice over, their previous education having often been insufficient. The students consequently get well "sorted over" before they can enter the last and highest course.

THE FOREMEN'S SCHOOL.—The following is the plan of Classes :—

A Mechanical division	...	Michaelmas to Easter half-year.
B Chemical	"	" " "
C Mechanical	"	Easter to Michaelmas "

	First course.		Second course.		Third course.	
	Hours per week.		Hours per week.		Hours per week.	
	A & C	B	A & C	B	A & C	B
Arithmetic	7	6	...	...	...	...
Geometry	5	4	...	...	...	...
Physics	4	4	2	2	...	...
Geometrical drawing, &c.	8	...	...	...	...	...
Freehand "	4	2	4	2	4	2
German language ...	4	4	4	4	2	2
General chemistry ...	...	12	...	...	...	...
Mathematics & mechanics	...	...	8	...	4	...
Machinery in general ...	...	...	2	...	6	...
Mechanical technology ...	...	...	4	...	...	4
Machine drawing ...	...	...	8	...	8	...
Surveying and water measurements ...	...	...	4	...	...	...
Technical chemistry ...	...	...	...	6	...	6
Practical " in						
Laboratory ... ..	...	...	...	12	...	20
Mineralogy ... ..	...	...	...	4	...	...
Book-keeping ... ..	...	...	...	...	2	2
Architectural drawing ...	...	...	...	...	4	...

In addition, all students in the 2nd and 3rd courses have the opportunity of attending the following special classes:—

On mills (corn, sawing, &c.), and their construction	2 hours weekly, Winter half-year.
Spinning (cotton, wool, flax, jute, &c.)	4 " " "
Weaving " " " "	4 " Summer "
Waterworks, &c.	2 " " "
Tool-building for machinery	2 " " "
Brewing, mechanics, and machinery ..	2 " " "
Finishing in printing and calico works, &c.	2 " " "
Paper manufacture	2 " " "
Fire extinguishing apparatus	2 " Winter "

THE ROYAL BUILDING School, also an adjunct of the State technical educational institutions, offers through its systematically arranged courses of instruction, the means of education to those who wish to prepare themselves for any of the branches of the building trade. Those who have not this special object in view can only attend particular classes as far as they may be still unfilled. The instruction is given and completed in four winter courses, hitherto it was only in three. About a year ago, the Home Minister sanctioned a fourth one, with the object of rearranging the hours for the different classes and to enable more time to be devoted to drawing.

Pupils entering must be 16 years of age, and must have passed the lower second class of a real school 1st order, or gymnasium, or have the one year volunteer certificate. Others who have not done this must pass an examination on entrance, and have the qualifications showing that they have passed a higher citizen's school. The students must, as in the Foremen's School, give their whole time, and have been employed for two half years previously to entrance in practical building. In special cases, one of these half years' work can be done between the winter courses, so that the whole course of practical and theoretical education comprises about three or three and a-half years. The students are under the discipline of the school as in the Foremen's School; and the rule is applicable here also, that any student who goes through the same course twice without acquiring sufficient proficiency to enter the next higher course must leave the school.

The fees are 30s. for each course or half-year, and expenses of materials come to about 25s. Worthy, but poor students, can obtain remission of the fees and obtain pecuniary assistance from the State, as in the case of the Foremen's School.

The following table shows the subjects of instruction, and the time devoted to each, in this school :—

Plan of Classes.

	First course. Hours weekly.	Second course. Hours weekly.	Third course. Hours weekly.	Fourth course. Hours weekly.
General principles of building ...	4	2	...	...
Elements of form and architectural drawing	6	4	...	...
Freehand drawing	6	4	4	4
Mathematics and arithmetic ...	5	4	4	...
Geometry	5	...	...	...
Descriptive geometry and per- spective	8	2	...	2
German language	4	4	2	..
Construction, first, in stone ...	...	4	2	...
„ second, in wood ... ..	...	4	2	...
„ third, in metal ... ..	...	...	...	4
Legal building regulations ... ..	...	1	...	...
Designing plans of buildings ...	...	5	12	16
Physics ... ..	...	4	2	...
Preparation of estimates ... ..	...	...	3	...
History of the art of building ...	...	...	2	...
Mechanics ... ..	...	...	4	...
Heating and ventilation ... ..	...	...	...	4
Land surveying, &c. ... ..	...	...	...	4
Book-keeping ... ..	...	...	..	1 or 2

The school is a parallel one in almost every respect to the Royal Foremen's School, and is for young workmen who have worked manually in their profession and want to educate themselves theoretically and systematically; and the students are mostly young stonemasons, house decorators, carpenters, joiners, and specially those handworkers who intend devoting themselves to the more ornamental parts of the trade.

The previous education of the students having been very various and in many cases insufficient, many, as in the Foremen's School, do not succeed in going through the four courses, some being obliged to leave at the end of the second, and a good number at the end of the third. The courses are only winter ones, and the young men work and earn as much as they can in summer, and often save enough, with a little

assistance from friends, to support themselves in winter while attending this school; and the fees being extremely low, they are thus enabled to fit themselves for higher positions in their respective trades.

THE ROYAL DRAWING SCHOOL.—This school is an evening adjunct for teaching art in its various branches, and is attended by pupils from the mercantile and other schools in the town; the pupils, in fact, are drawn from all classes. Instruction is given four evenings weekly in freehand drawing—drawing from the cast and models, in machine drawing, in “working drawings,” and in architectural drawings. The fees are low, and bring the school within the reach of all.

We have now described all the Schools in detail which constitute the State Technical Educational Institutions. They are essentially State and non-local in character, though for Saxony they are in their right locality, Chemnitz being the industrial and manufacturing centre of the country. The expense is borne mainly by the State, as the fees of the pupils—£3 a half-year for the higher technical, and 30s. a half-year for the Foremen and Builders’ Schools—are not sufficient to pay one-tenth of the expenses. The burden would be far more than the town, already one of the most heavily taxed in Germany, could bear. Nor does the town itself derive the sole benefit from the schools, nor even the principal advantage, as will be seen from the fact, that of the 540 students attending the higher technical Foremen’s and Building Schools in the year (leaving out the Drawing School, which is an evening one only),

81	or	15	per cent. of the number were from Chemnitz.				
305	„	56 $\frac{2}{3}$	„	„	„	„	the rest of Saxony.
386	„	71 $\frac{2}{3}$	„	„	„	„	Saxons.
121	„	22 $\frac{1}{3}$	„	„	„	„	other Germans.
33	„	6 $\frac{1}{3}$	„	„	„	„	non-German.
540		100					

But this does not detract from the influence of the schools in developing the industries of the town and district, for many of the students who are drawn from other places remain and settle in some one of the branches of the town's industries. Technical institutions such as those already described ought to exist in the Midland counties—at Nottingham, for instance—for the benefit of the surrounding districts; and Derby, Leicester, Loughborough, Lincoln, and all the other neighbouring towns would participate in the advantages offered.

Before turning to our next school, I must not omit to mention, that every year a number of the teachers receive from the State an allowance or grant for travelling purposes during the summer vacation, for the special purpose of visiting some country, or city, or exhibition, connected with their special branch, and thus are enabled to keep themselves *au fait* with all the newest developments in science and inventions in different industries. Thus, during the autumn of 1878, says the report issued at Easter, 1879, a number of the teachers received "travelling grants:" the director and three professors were sent to the Paris Exhibition, one on a journey of instruction to Berlin, and one on a journey of health.

Many of the professors spend much time in scientific investigations and give lectures in the town.

THE STATE TECHNICAL EDUCATIONAL INSTITUTION.—The Government has just given to the Institution, at a cost of about £600, a machine for tearing and testing iron and other metals, to ascertain their tenacity. It is the only one in Saxony. A further grant of £600 was made last year for a gas motor to work it and other machines. There is also a curious collection of broken axles in the museum, from railway locomotives and carriages. Every axle broken in the country in railway service, has to be sent here, where they are described, and labelled, and the cause of the breakage noted. The collection, it is thought, may prove of value hereafter.

THE HIGHER WEAVING SCHOOL.—We now come to the Higher Weaving School, founded in May, 1856, which has been of great benefit to the trade of the town and district. Similar schools exist in the neighbouring towns of Glauchan and Meerane, besides schools for a similar object, with a less extended course of instruction in Lössnitz, Oederan, Mittweida, Hainichen, and Frankenberg, places adjacent to Chemnitz, where the weaving industry is mainly carried on. That in Chemnitz is the largest and most important, and is in many respects a model institution, combining practical and theoretical instruction in a course of one year, sufficient to enable a young man to acquire knowledge enough, with experience in working looms, to enter some business or manufactory. The present building erected about 10 years ago, is in the centre of the town, close by the “Real School,” and is a fine substantial structure, three storeys high.



The class rooms are lofty and well lighted; and on the basement is a large room containing fifteen power looms, each of different construction, driven by a small steam-engine. On the first and second storeys are two similar large rooms, containing forty-three hand looms. Each of these is also of different construction, producing some variety of work, and the pupils

work on them in a regular course, beginning with the simplest and gradually advancing; during the first half-year on the hand, and the last half on the power looms. There is variety enough to produce all kinds of textile fabrics, from the finest silk handkerchiefs to the coarsest carpet, and from all materials. Mr. Gill the then president of the Associated Chambers of Commerce for Scotland, a gentleman in the weaving trade, when visiting this school with me more than 10 years ago, was delighted with it, and told me he found there, varieties of looms he had heard described but had never seen in any other place.*

The land on which this school is built was granted by the town, and is about £500 in value. The building itself cost £4,000, and was paid for by the town also, but the State pays the town 6 per cent. on the capital; 5 per cent. as interest, and 1 per cent. for repairs; the looms and appurtenances are valued at £1,500, making a total of £6,000. It is town property, and entered as such in the land registry. The town and State each grant £150 annually to the school. This and the fees of the pupils barely meet the expenses of the institution, and the deficiency has to be made up either by the town or State from year to year. The course is for one year, and the fee charged to each pupil is £13. 10s. 0d., besides some small sum for materials and books. The school is under the management of a committee, comprised of two aldermen or *stadträthe*, for the town, the director of the Higher Technical School, for the State, and a manufacturer in the trade, for the

* I would here call special attention to the immense advantage gained by a young man who is to be a future master, manager or foreman, and who has passed through this school, in being practically acquainted with every class of work made upon the loom. In the same way, in the Mechanical School, by learning the construction, not only of the particular loom used in his own branch of the trade, but also of every class of loom, whether adapted to produce the finest cambric or the coarsest carpet.

In an industry like the Nottingham lace trade, for example, how invaluable it would be to the youth who has to gain his livelihood therein, whether he proposes to work the machine, or to build it, or merely qualify himself as factory manager, if he could be scientifically grounded in the use or in the construction of the machines employed in each branch of the trade, thereby learning the specialities of each.

trade. There are four teachers, one of whom is resident, and two are for practical weaving. At Easter, 1879, there were 40 students finishing their course. The attendance varies from 30 to 50 annually. The conditions of entrance are not onerous; students must be 14 years old, and must have received a fair education. The object of this school is (I quote from the prospectus), by means of careful technical education and practical working on looms, to educate young men for their future career, who intend to devote themselves to the weaving trade in any of its branches, either as manufacturers, buyers, managers, salesmen, &c.; to give them exact knowledge of the details of the manufacture, so as to enable them to become competent judges of goods and their value. It thus aims at educating the brains of the trade, the men who in future are to carry it on, and not the workmen. Nor does it attempt to teach how to *build* looms, hand or power. That is taught in its proper place, in the mechanical technological division of the Higher Technical School, as a branch of machine building generally. The school is attended by young men from all parts of Europe. *The large manufacturers of Bradford, Huddersfield, Saltaire, &c., send their sons here because there are no institutions of the same kind in England.*

The curriculum is as follows, in two divisions:—

DIVISION A. FIRST HALF-YEAR. THIRTY-EIGHT
HOURS WEEKLY.

Class 1. On weaving materials.

- „ 2. On construction and systems of different hand looms and auxiliary frames.
- „ 3. The analysing of woven fabrics and method of obtaining the patterns, costing, finishing, &c.
- „ 4. Practical weaving on different looms.
- „ 5. Composition of fabrics, patterns, &c.
- „ 6. On the elements of power looms. Drawings for instruction in power loom weaving.
- „ 7. Freehand drawing and instruction in sketching parts of looms and machinery.

SCHOOL PLAN OF THE HIGHER WEAVING SCHOOL IN CHEMNITZ.

FIRST HALF-YEAR.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
In the morning, 8 to 10 o'clock.	Decomposition of patterns.	Decomposition of patterns.	Working on loom.	Decomposition of patterns.	Decomposition of patterns.	Drawing.
In the morning, 10 to 12 o'clock.	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
In the afternoon, 2 to 4 o'clock.	Working on loom.	Theory of hand weaving.	Theory of hand weaving.	Composition.	Working on loom.	—
In the afternoon, 4 to 6 o'clock.	—	—	Elements of machinery and theory of me- chanical weaving.	Elements of machinery and theory of me- chanical weaving.	—	—

SECOND HALF-YEAR.

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
In the morning, 8 to 10 o'clock.	Decomposition of patterns.	Working on power looms.	Theory of mechanical weaving.	Working on power looms.	Decomposition.	Working on hand looms.
In the morning, 10 to 12 o'clock.	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.	Ditto.
In the afternoon, 2 to 4 o'clock.	Drawing.	Drawing.	Working on hand looms.	Theory of mechanical weaving.	Theory of mechanical weaving.	—
In the afternoon, 4 to 6 o'clock.	—	Theory of hand weaving.	Composition.	—	—	—

DIVISION B. SECOND HALF-YEAR. THIRTY-EIGHT
HOURS WEEKLY.

- Class 1. On power looms and preparatory machines.
 „ 2. Practical working on power looms.
 „ 3. Composition of fabrics, patterns, &c.
 „ 4. Analysing of Jacquard stuffs, in silks, gauzes, bands,
 in connection with the necessary arrangement of looms
 and finish.
 „ 5. On the construction of Jacquard looms, as well as of
 other complicated arrangements in looms.
 „ 6. Practical instruction in Jacquard weaving in all materials.
 „ 7. Freehand drawing and composition of coloured patterns, &c.

THE TECHNICAL HOSIERY SCHOOL IN LIMBACH.—This is a school similar to the Weaving School just described. Limbach is a small town about eight miles from Chemnitz, in which hosiery and gloves are extensively made. The real centre of the trade is at Chemnitz, and it was owing to special influences that the school became located at Limbach instead of at Chemnitz, its natural place, and where it would have been far more useful and successful. The history of its origin, I need not detail further than by mentioning, that the need and idea of foundingsuch an one having been mooted and discussed for many years, it was resolved by the inhabitants to commemorate a visit of the late King John of Saxony to Limbach, by opening a subscription for the purpose of founding a School of Hosiery, and in a few days over £1,000 was raised. This, with additional sums given by Chemnitz and other towns, was sufficient to start the undertaking, and the want of such an institution having long been felt, its success was assured. It was opened on 6th April, 1869, and began with 20 pupils. The school is under the control of the Home Minister, and enjoys State support as well as assistance from the town of Limbach. It is managed by a Committee of nine members, mostly manufacturers in the trade at Limbach, representing both branches.

The course is for one year. The fees for the course are £9 for Saxons, and £15 for Non-Saxons. These fees are not sufficient to cover the expenses of the school; many hosiery

and glove firms in both towns subscribe handsome sums annually, and these, with the State and municipal grants before mentioned, just suffice.

The technical and theoretical instruction is given by the Director, Herr Willkom, and one master ; and there are two teachers for practical working on the frames.

The school is in one respect different from all the others, being now an independent corporate body and possessed of legal rights, and belongs consequently to no other public body, but constitutes one of itself. It cost—

Land	..	..	..	..	£180	0	0
Building	..	..	..	..	900	0	0
Machines	..	..	..	..	1,000	0	0
Total					£2,080	0	0

Many of the machines and frames have been presented to the school by friends and firms in the trade, and additions are constantly being made. It has a few power looms, but at present no steam-engine, which, however, as time goes on, and its usefulness becomes more appreciated, will doubtless be added. There is already the nucleus of a museum of hosiery machinery, which must ultimately become valuable and interesting. At present it contains—

- 21 Iron and wooden hand looms.
- 7 Plain mechanical "
- 11 French circular frames.
- 4 English " "
- 6 Knitting frames.
- 4 Hand "ketten" (*tricot*) frames.
- 1 Power wide ditto.
- 2 Turning off frames.
- 6 Seaming "

A library is also being formed, and a collection of copies of all patent rights. All new patents published are taken as they appear.

The pupils, as in the Weaving School, have to give their whole time to school duties ; they must be 15 years old, and have received such an education as is afforded by a good

district school, and be able to read and write fluently and correctly, and to reckon in the four rules of arithmetic. The following is the

SCHOOL PLAN OF INSTRUCTION.

DIVISION A. FOR PUPILS OF LESS FAVOURABLE EDUCATION.

Arithmetic	5 hours weekly.
Geometry and geometrical and mechanical drawing	6 " "
Physics and mechanics	2 " "
Technology of spinning, in summer only	3 " "
" " hosiery weaving	6 " "
Practical working of frames, pulling to pieces and rebuilding	14 " "
Freehand drawing	2 " "
Book-keeping by single entry	2 " "

DIVISION B. FOR PUPILS WITH A BETTER EDUCATION.

Arithmetic	3 hours weekly.
Drawing machinery	4 " "
Mechanics	2 " "
Technology of spinning, in summer only	3 " "
" " hosiery weaving	6 " "
Practical working the frames, pulling to pieces and rebuilding	16 " "
Freehand drawing	2 " "
Book-keeping	2 " "

This school up to the present time has enabled a considerable number of young men to fit themselves for middle class positions, such as takers in, travellers, sub-managers, and managers in factories and the finishing departments of the trade. No attempt is made to give instruction in the building of hosiery machinery, only in the different classes of machines used, in the mode of working, and in the varieties and kinds of work produced ; and as the detail in the trade is very great, there being a considerable variety of machines for special objects, owing to labour being much subdivided, those students who attend are, as far as the means of the school allow, taught how practically to work the machines, and at the same time an insight is given them into the mechanical principles upon which each system is founded. They are also taught how to

make different classes of goods in cotton, merino, wool, and silk, and to discriminate qualities, styles of make and fineness, so that when the student enters some firm for three or four years' apprenticeship, he has already obtained a knowledge of the elements of the trade, and is not only fitted to some extent for practical work at once, but can educate himself rapidly for any position he sees within his reach. In short, a young man is taught systematically with a great variety of machines at his disposal what he otherwise must pick up in the warehouse or factory, by odds and ends, during a long wearisome apprenticeship, in a desultory manner. It is an attempt to provide a remedy for the break-down of the old apprenticeship system, which is now practically, as far as learning the trade goes, a sham and a mockery. In the short time allowed in this school, very much cannot be accomplished, but a lad can obtain, by attention and industry, such an insight into the manufacture as is sufficient to start him on his career. The school is comparatively in its infancy, and will require some years yet before it can rank with the Weaving School, or take that position in the trade it ought to occupy. If located in Chemnitz, the attendance would, no doubt, increase more rapidly; more interest would be taken in it generally, and its progress would be proportionally greater.

The hosiery trade is in a double transition state. From a manual house industry, it is becoming a power industry in factories, and from a plain staple trade, it is turning into a fancy season one. This change, almost accomplished in England, is progressing in Saxony. The "manufacturer of the future" will have to make fancy goods from power machinery to suit a season's trade and to catch the passing fashion of the day. Whoever does this best and cheapest—whether at Nottingham, Chemnitz, or Troyes—will get the trade. Nottingham, which has hitherto had the supremacy, now complains that Chemnitz is taking the trade away, owing to the cheapness of Saxon labour. This, no doubt, is a main cause, but is it the only one? Cheap labour may enable the Chemnitzers to get the trade, but cheap labour alone, with the

existing outlook, will not enable them to keep it; for without trained intelligence and technical knowledge on the part of the workmen, and enterprise among the manufacturers, it would soon revert back again. In future, manufacturers and their responsible men will require a far more extended technical training than in the past, and if labour is cheap in Saxony and the trade there has its Technical School educating young men, how necessary it is that the people of Nottingham, fighting against these odds, should strain every nerve and omit no means to hold their own!

An institution, therefore, of this kind, but on a more extended scale, is much needed in Nottingham, and with the means and wealth at the disposal of the trade ought to be founded at once. There should be a *Higher Division* of the school for the sons of manufacturers, &c., and a two years' course of technical instruction, theoretical and practical, for youths from 14 to 16 or from 15 to 17 years of age. During this time, the previous general education of the pupil should be continued; and thus, then, instead of a 5 to 7 years' apprenticeship, 2 or 3 years' would suffice. Further, a *Lower Division* should be established for boys with less means, for sons of persons in secondary situations in the trade, with a one year's course, adapted to their probable future career. And lastly, an *Adjunct Foremen's School* is wanted, with a course of two half-years (perhaps winter half-years) for young workmen who wish to obtain the necessary theoretical knowledge of frames and experience in mechanical drawing as will fit them to become foremen and overlookers.

The building once found and furnished by the trade, the school could be made in the main self-supporting. The machines, &c., required by the pupils to learn on need not be new, and might be contributed by the different firms at comparatively little cost, and in this way an historical museum showing the gradual development of the trade would be formed. The most difficult thing in the first instance would be to find suitable teachers—men combining the necessary technical knowledge and experience of the trade, with experience of

teaching.* If such a school were ever founded, care should be taken that it is really used by the town and district and by those for whom it is intended.

THE AGRICULTURAL SCHOOL was founded in November, 1877, by the District Agricultural Society of Schloss Chemnitz, and has the object in view of giving general instruction bearing on agriculture and modern systems of farming. It is for the sons of small farmers. Five per cent. only of the landowners in Saxony have farms of over 100 acres, the remaining 95 per cent. are middle-men and smaller holders. The children of these men are educated in the small village elementary schools till the age of 14, and then leave school. The Agricultural School carries on their education, adding some of the elementary sciences bearing on their future life, and it also endeavours to teach them how to carry on their farming in a business-like manner. It is under the Home Minister, and enjoys a small State grant, and is managed by a local committee chosen by the above-named society. Pupils are taken from 14 to 25 years of age, and instruction is given in two winter courses of half a year each. The school opened with about 20 pupils; in the second half-year about 48 attended; and this winter (1879) over 60 came, and the rooms are quite full; indeed, so many applied that a summer course will be given this year, and doubtless continued. The fees are 40s. the course, and the instruction is given by the director and seven teachers. There are two classes, and 36 hours' teaching weekly, as follows:—

					CLASS II. Hours Weekly.	CLASS I. Hours Weekly.
German language	..	..	..	..	4	4
Geography and history	..	..	..	..	2	2
Arithmetic	..	..	..	..	3	0
Geometry and surveying	..	..	..	..	2	2
Caligraphy	..	..	..	..	2	0

* The action of the City Guilds Institute in promoting Technical Classes in provincial towns, by means of its system of examination, is likely to lessen this difficulty. The difficulty cannot, however, be wholly overcome till there exists a Central Technical Institution for the training of Teachers.

	CLASS II. Hours Weekly.	CLASS I. Hours Weekly.
Geometrical and technical drawing	2	2
Freehand drawing	2	2
Gymnastics	1	1
Zoology and botany	8	0
Mineralogy, &c.	2	0
Physics, chemistry, and meteorology	7	6
In Farming: Breeding	0	5
" " Planting, nursery, gardening, &c.	0	6
" " Management, cost, book-keeping, &c., of farms	1	6

The school has only just made a start, and promises to become useful. There seems to be need of such an one, and there are already many applicants for entrance. There are five or six similar schools in other parts of Saxony.

THE SCHOOL FOR HAND WEAVERS.—This school, founded in 1867, is to teach young weavers their trade, and to enable such as have capacity for it to qualify themselves to become foremen, underclerks, &c. It is supported by the fees of the pupils, and receives a small State grant, as well as assistance from the town and weavers' guild. It is under the care of a special committee; the fees are sixpence a month, except to indigent lads, who are admitted free. Instruction is given by 5 teachers, in 9 classes, as follows:—

- 2 Classes in theoretical mechanical weaving. } By power and
- 2 " practical " " } hand.
- With 4 power looms, and 8 hand looms, "each loom being of different construction.
- 2 Classes in mechanical weaving, with 4 looms of different construction, and in mounting them, &c.
- 1 Class in pattern drawing.
- 1 " " analysis.
- 1 " " book-keeping.

The school is open on Sundays, and in the evenings of week-days.

THE TAILORS' SCHOOL, founded 1st July, 1873, is an evening school for assistants and apprentices, who are taught the practical part of their trade. It is open once or twice a week. Apprentices receive instruction gratis.

THE TRADE "FORTBILDUNG" SCHOOL was founded many years ago by the "Operatives' Society," to give young persons

of all professions and trades the opportunity of enjoying further education (after leaving school) in matters generally relating to, and of use in, their future careers. Originally, it was a Sunday school, but was re-organized in 1877, and extended to the week days; and in the Society's report for 1878-79, it is stated that the first year after this change, which might be considered a test one, was most successful.

The school hours are 10 to 12 a.m. } Sundays,
 1 „ 3 p.m. }
 7½ „ 9½ „ Mondays.

The fees are 2s. per year, besides an entrance fee of 2s. The instruction is given by 44 teachers, all, with exception of special drawing masters, belonging to the district schools; and special attention is paid to the practical use of ornamentation in the various handicrafts. The society possesses a museum located in the higher technical school of a practical character, with various objects of modern invention, and is used by the school. There is also a library attached, containing about 1,100 volumes. Boys who attend this school are absolved by an order of the Educational Department from attending the "Fortbildung" Schools attached to the district schools, and previously described. This is the cause of the large attendance at this school. The following table shows the subjects of instruction, and the number of classes and pupils:—

	No. of Classes.	No. of Pupils.
German	12	439
Arithmetic	12	444
Book-keeping	5	175
History and geography	2	67
Geometry	1	21
Physics	1	25
Stenography	3	81
French	3	107
Foremen's course	1	24
Freehand drawing	11	277
Geometrical „ ..	5	122
Descriptive geometry	2	46
	<hr/> 58	<hr/> 1,828

THE GIRLS' "FORTBILDUNG" SCHOOL.—This Institution also was founded by the Operatives' Society, and, under the

same management, is a similar school for girls, and with a like object. Instruction is given three or four days weekly, from 4 to 6 o'clock p.m., in history, mercantile arithmetic, German, correspondence, book-keeping, &c., and the fee is 4s. 6d. per quarter. Early in 1879 it was attended by 65 pupils.

The reader who has patiently gone through this somewhat detailed account of these various schools, will be in a position to form a clear and general idea of what is being done in an industrial town of 90,000 inhabitants in Germany for their general and technical education; and on comparing this account of the schools with the little sketch of the town and its industries, given at the opening of this paper, he can judge if the education here provided is sufficient in degree, suitable in character, and cultivating in its effects. He can further compare it with the educational equipment of similar towns in England. For my own part, I do not hold this system of instruction up to blind admiration, to be servilely copied, nor do I consider that technical education is the universal panacea for bad trade. My sole object in writing this paper has been to give information, leaving each reader to draw his own conclusions, and I have been careful to give the facts impartially. Nor do I wish to try and convert to the side of technical education those who do not at present believe in it. *Stress of foreign competition, protective tariffs, and other natural causes, will do that more efficiently than any argument.**

But much undoubtedly can be learned from a careful study of foreign schools; and in a town like Nottingham, where so much is being done in organising new educational institutions, valuable hints may be obtained. In considering the expenses of these schools, and the burden involved in

* The first lace machine has left Nottingham for Plauen, in Saxony. More are to follow. How many will be in Saxony in ten years' time, I leave the reader to surmise. Twenty years or more ago this very same experiment was tried with lace frames, and failed, as technical knowledge was insufficient amongst the workmen. Now it is sufficient, and the success is assured.

their maintenance, it must be borne in mind that Saxony is a poor country, with a semi-Siberian climate, and especially that Chemnitz is generally understood to be the second heaviest taxed town in Germany. This heavy taxation is, no doubt, partly the result of this system of education and partly of the rapid growth of the town. Why then, it may be asked, do the Chemnitz people cheerfully put this burden on their backs, disliking taxes quite as much as other people do? It is because they feel the absolute necessity of maintaining their educational institutions in their completeness. Nor must it be forgotten that the cost represents relatively a much larger amount in Chemnitz than in England, owing to the cheapness of labour—skilled labour of the highest order, and also of teaching. If these teachers were salaried, and the buildings paid for, at English rates, the amounts would certainly be $33\frac{1}{3}$ to 50 per cent. higher. The fact, however, is clearly realised in Saxony that this educational outlay, serious as it is, is necessary to the development of trade and to the prosperity of the people, and will repay itself a hundred-fold in this and the next generations. It is a question of prisons, reformatories, and the like, *versus* elementary schools; of workhouses, emigration, &c., *versus* trade and technical schools; and, finally, of poor rates *versus* school rates. And the Saxons—Government, municipalities, and people, for all are at one on this question—are shrewd enough to choose to put their money into the latter investment instead of the former, knowing that it will pay best in the long run. So eager are the people and towns and communes for educational establishments, that the Government have often to put the drag on. Only just lately, in a debate in the Saxon Chamber, the Government representative said that Real schools of the second order were “springing up like mushrooms everywhere,” more than are really needed.

The following summary gives a general view of the Educational equipment of the town of Chemnitz, leaving

out minor schools for special objects, not bearing on the main question :—

GENERAL EDUCATION :—

	Cost.	Pupils.	Teachers.
District Schools	£80,241	9,827	185
Fortbildungs Schools ..	—	993	—
Higher Citizens' Schools ..	36,166	1,573	58
Gymnasium Schools	13,353	357	24
Real School	17,765	437	27
Public Mercantile Schools ..	5,500	167	8
	<u>£153,025</u>	<u>13,354</u>	<u>302</u>

TECHNICAL EDUCATION :—

State Institution	81,943	541*	52
Higher Weaving School ..	6,000	40	4
Agricultural School	—	60	5
Trade Fortbildungs School ..	—	1,828	—
" " (girls) ..	—	65	—
	<u>£87,943</u>	<u>2,534</u>	<u>61</u>
Add General Educational above ..	153,025	13,354	302
Total	<u>£240,968</u>	<u>15,888</u>	<u>363</u>

Of this total of nearly a quarter of a million, £95,296 belongs to the State, and £145,672 to the town.

The amounts paid for the maintenance of these schools I have not ascertained, though it would only require a little trouble to do so, but some idea of the expense can be formed from the fact that the salaries of the teachers in the district and higher citizens' schools amounted in 1878 to £23,780 alone.

The outlay is large, but the system is economically worked, as the schools fit into one another, and do not trench on one another's ground. There are no two schools competing against each other, and consequently no loss of teaching power. This will be seen by a review of the whole system, which will also enable the reader to see how the schools are graduated, and supplement one another.

In primary education, the district and higher citizens' schools are the basis of the system, and are arranged in size, number, and locality to take in the exact number of children

* Excluding Drawing School—an evening one.

which the town records show will be required, and as the population increases and the town extends new districts are added. The system is expansive—sufficient for present wants, and equal to new requirements as they appear.

In secondary education, the gymnasium, real, and mercantile public schools meet all the necessary requirements of the town, and the higher citizens' and district schools specially prepare pupils for them. The fifth class of the former runs underneath the lowest class of either the gymnasium or real schools, so that boys who have passed this fifth class can enter these schools at once; while boys who have passed through the full course of either the district or higher citizens' schools can enter the mercantile school. These schools, especially the gymnasium and real school, while giving a really first-class general education complete in itself, sufficient to prepare any young man for good and well-educated society and general business life, prepare their students for entrance into the next higher range of educational institutions—viz., the higher technical schools, seminaries for training teachers for mining and other academies, and, finally, the university, according to the future calling the student has chosen.

Lastly, technical education is provided for as described, and is adapted to the wants of the town and its special trades, and is so arranged that the lower schools, as just explained, lead up to the various technical courses, and lay the basis for them.

DEFICIENCIES.—In the foregoing summary of the schools of Chemnitz, it may have been observed that there is a singular deficiency of schools for the higher education of girls, as compared with those which already exist, and are being now established in England. Some attempt has been made to meet this deficiency by the addition of two higher "selecta" classes, as they are called, for girls of 14 to 16, in the higher citizens' (girls) school, under Dr. Holscher's directorship. This is a step in the right direction, and will doubtless be adopted in time in the parallel school on the Annenn-Strasse.

The town owes many thanks to this gentleman's energetic and intelligent alterations in the system of girls' schools, and to his adoption of more sensible principles in the higher citizens' schools during the last ten years. He has carried out, under proper limitations, the idea that the training of the mental powers and moral character is the true object of the school, rather than the mere acquisition of knowledge. To cultivate the mind, in preference to cramming it with positive knowledge, is his leading principle.

Again, in the technical department, no provision is made for teaching the various operatives, male and female, their different trades. The school for hand weavers is the only one of the kind, and is, as far as it goes, the right sort of thing.

The apprenticeship system still exists and nominally does the work, and no doubt in such handicrafts as shoe-making, tailoring, &c., accomplishes its object after a fashion. But in the main industries carried on in factories, the apprenticeship system is breaking up in the manner described by Mr. Howell in the extract before quoted. The lads are literally "pitchforked" into the workshop, factory or dye-yard, to pick up as best they can the rudiments of their work, and badly is it done. The class of workmen now growing up are not to be compared with their predecessors. No remedy for this has, up to the present, been attempted. The need has not been so pressing, and all available energy and intelligence have been consumed in building up the industries themselves and the present educational system. Saxony, as an industrial country on any scale, has existed only for 30 years, and it will take another generation before this large and important question of artizan technical education can be dealt with.

Excepting these two points of failure, due provision seems to have been made for all. I have omitted to state that there are a number of kindergarten schools in various parts of the town. Also that private lessons are given by many of the teachers and professors in the town, during evening hours, in their special studies. Languages, music, singing and special sciences are much taught in this way.

Before closing this paper, it will be interesting to trace various typical careers and classes through the different schools. The lowest classes, children of working men, little shopkeepers, and the like, attend the district schools, from the age of 6 to 14 or 15, they then are apprenticed or get work, continuing to attend one or other of the "fortbildung" schools for two years longer in the evenings twice a week. After working at their trade for two years, they have the chance, if special ability is shown, of attending the Foremen's, Building, or Drawing Schools, supposing their trade or profession requires it.

The lower middle classes send their children to the higher division of the district school, and even to the higher citizens' schools, and follow mostly the course of the class below. The middle and wealthier ones send their children to the higher citizens' schools. They stay till the 5th class is passed, and then either complete the course up to 15 or 16 years of age, or branch off, as their parents decide, to the gymnasium or real schools. Thus, a boy who is to become a lawyer or medical man, would complete the full gymnasial course, and afterwards go to the university; or if he were to become a teacher, to one of the seminaries. The pupils who are intended for the learned professions, would attend mostly higher district schools—the gymnasium and University. On the other hand, the future manufacturers, architects, machine builders, &c., go first to the higher district school, then either to the real school or gymnasium till 16, then to the higher technical school till 20 or 21; they then undergo one year's military service, which makes strong men out of boys, and fits them for the battle of life. Future tradesmen, larger shopkeepers, and others, go through the higher citizens' school the full course, and then to the mercantile school. The changes in varying the courses may be rung indefinitely, and are practically varied according to the individual position and prospects of each child. The schools are, in short, so graded that they can be and are passed through, from the lowest district school in varying courses up to the

University, as well as to the highest technical institutions and academies in the kingdom.

My task, a pleasant one, is finished, and if I have done anything, however trifling, to help on, as regards technical education, the "new apprenticeship," my labour is amply rewarded. Here, at any rate, is a picture, in hard and cold lines it is true, of such a new apprenticeship for the middle classes. If England is to maintain her proud position as the greatest industrial nation in the world she will, *nolens volens*, have to bend herself to this question and solve it, both for manufacturers and artizans. We have only to look on it as a piece of work, necessary, laborious and enduring, to be done as a duty to our country, and though, as the poet says—

Die Kunst ist lang, das Leben kurz, das Urtheil schwierig,
the end will soon be accomplished.

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